CONVENTION ISSUE

INFORMATION LETTER

Not for Publication — NATIONAL CANNERS ASSOCIATION — For Members Only

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Proceedings of the 47th Annual Convention

Activities of the National Canners Association in the field of consumer education and promotion of the public use of canned foods will be greatly expanded in 1954. The N.C.A. Board of Directors approved expenditure of an additional $150,000 and employment of the professional firm of Dudley, Anderson & Yutzy to assist in such activity. This action taken at the Convention in Atlantic City culminated a year of study and planning by the Special Committee headed by William A. Free, Sr., which made the recommendations in reports to both the Administrative Council and the Board, receiving unanimous acceptance by both groups. Mr. Free's report and the outline of the program by George Anderson, which were presented to the Board, are reproduced on pages 16-20.

Following is the resolution covering this action:

Resolved, that the recommendation of the Special N.C.A. Committee to Study Ways and Means of Increasing the Public Acceptance and Use of Canned Foods be approved, that the recommended one-year appropriation of not more than $150,000 to finance the program for 1954 be made, that the Executive Secretary be authorized and directed to develop within the Association an appropriate staff organization to administer the program, and that the officers of the Association be authorized to employ the firm of Dudley, Anderson & Yutzy to assist the Association in carrying out the developed program and that the sum of $150,000 be taken for this purpose from the surplus of the Association.

In order to get the program under way a series of meetings was held during the closing days of the Convention and a technical task group was selected to work on details with the Anderson organization and to coordinate the program with other similar promotions in the trade.

One of these is a major advertising program sponsored by the American Can Company, which was demonstrated at the Convention before the Special Committee when they met on Thursday, January 21, and was also the central feature of Canco's Convention exhibit. The Canco program consists of a series of national magazine color advertisements intended to broaden the use of canned foods by making women more aware of the wide variety of products available to them everywhere at any season of the year; and to increase the frequency with which canned foods are used by building greater public appreciation of the nutritional, time-saving, and appetizing possibilities of these foods. The Canco campaign complements the new N.C.A. effort by supplying the element of advertising which is not included in the N.C.A. program.

With formal action and announcement of both the N.C.A. and the Canco promotion programs,

1954 Officers of the N.C.A.

(left to right)

President E. E. Willkie, Vice President George B. Morrill, Jr., and Executive Secretary-Treasurer Carlos Campbell

and with several other similar efforts under discussion, the 1954 Convention took on what Chairman Free described as a "new look." This was evident also in the fact that two important program sessions of the N.C.A. agenda were dedicated to the marketing and merchandising interests of the canning industry. As chairman of these sessions Mr. Free stated that "our industry has needed this kind of emphasis for a long time now." In referring to approval of the DAY program, he said: "We hope for widespread results in terms of increased use of our goods. We are using the best available talent, both in the outside counsel we have employed and in those branches of the N.C.A. staff that are geared to educate and inform. The one thing needed to insure the success of this highly promising campaign is for every canner to do his utmost through individual and local efforts to support and extend these efforts. These two marketing sessions have been arranged for the specific purpose of helping you start your own individual effort to promote universal acceptance and use of your products."

Marketing Sessions

These sessions opened with a visual presentation by *Life* magazine entitled "Your Customer Today," with Charles B. Pearson and Arthur H. Chadwick of *Life's* retail sales promotion as narrators. The presentation included a quantitative analysis of the American market, showing changes in population, disposable income, living habits and other factors, and the effect of such factors on the market for foods. Edwin B. George, economist with Dun & Bradstreet, in an address on "The Business and Economic Outlook for 1954," furnished an economic background for this year's marketing and production plans. There was also an address by E. B. Weiss, Director of Merchandising, Grey Advertising Agency, Inc., on "The Coming Second Revolution in Food Marketing," which pointed out the effects on marketing, advertising and merchandising that are expected from the automatic devices made possible by the science of electronics. The program concluded with addresses on "Effective Merchandising of Canned Foods" from two points of view—that of the retailer, by Seth T. Shaw of Safeway Stores;

GEORGE B. MORRILL, Jr.

1954 Vice President

and that of the canner, by J. B. Weix of the Oconomowoc Canning Company. Mr. Shaw stressed the responsibility of the retailer in increasing the efficiency of marketing, and Mr. Weix, from his recognized experience, drew lessons and cited historic examples of how the canner can exert leadership in this area. Mr. Weix gave an enthusiastic appraisal and send-off to the new N.C.A. consumer relations program.

Emphasis on consumer acceptance of canned foods was apparent also in the general program sessions of the opening day, Saturday, January 23, when canners received a report on "Canned Foods in the Home," presented by Raymond A. Robinson, director of research of the Crowell-Collier Publishing Company. Full reproduction of his report on the usage and opinions about canned vegetables, fruits and juices by urban housewives, as well as of the speeches and presentations on the two Marketing Sessions appears elsewhere in this Convention issue. Also reproduced is the address by Brig. Gen. N. E. Waldron, Commanding General of the Quartermaster Market Center System, on "1954 Canned Food Procurement Plans and Requirements for the Armed Forces." The General announced QMC plans to discontinue set-asides and to purchase 1954-pack requirements through nationwide competitive bidding. The Pentagon took the occasion of this address to announce estimated military requirements for canned fruits and vegetables from the 1954 pack.

General Program Sessions

The general session on Saturday morning featured addresses by 1953 President Louis Ratzesberger, Jr.; Dr. Fredrick J. Stare, professor of nutrition, Schools of Medicine and Public Health, Harvard University; and by Oveta Culp Hobby, Secretary of Health, Education, and Welfare. President Ratzesberger stressed the worthwhileness of Association programs and their value to the cause of the industry as a whole and to the individual canner. He urged continuing support and participation from all sections of the country and segments of the industry.

Dr. Stare, with his father—former N.C.A. President Fred A. Stare—in the audience, spoke on "Nutrition and Your Health." His remarks included tributes to the contributions of the N.C.A. Laboratories and Association grants to various universities, stating that as a result "we probably know more about the nutritive values of canned foods than any other type of food. And I might add," he continued, "that the techniques of commercial canning have been so improved in the last two decades that the nutritive value of many canned foods is actually superior to that of many fresh foods as ordinarily available to the consumer."

Mrs. Hobby likewise acknowledged the fine performance of the canning industry and the N.C.A. in sharing interest and responsibility with FDA and the U. S. Public Health Service on several matters involving the public welfare. She spoke of the initiation by N.C.A. in 1927 of research into means of avoiding enormous water waste and mentioned the accomplishment of the Western Branch Laboratory in demonstrating possibilities of reduction of water requirements of canning plants. She cited examples of industry and Association support of desirable food laws, and characterized N.C.A. leadership on the McNary-Mapes amendment of 1930 as having ushered in a new era of "benefit to consumers, manufacturers, and government."

Discussing the Hale bill, which would shorten standard-setting procedures, she expressed her Department's approval of the measure. "Our aim," Mrs. Hobby asserted, "is to insure that the consumer gets products which are pure, wholesome and both informatively and honestly labeled. It is in our mutual interest to do all that is in our power to see that the minority of laggards conform to proper standards. Few Americans realize the extent to which the Food and Drug Act protects their health and their pocketbooks. They have not always heard, either, of the great part played by your industry in the continuous improvement of that far-sighted statute."

At the afternoon session on Saturday the canners heard John H. Davis, Assistant Secretary of Agriculture, speak on "Marketing—the Job Ahead." Mr. Davis, whose plan to leave USDA soon to become Director of the Moffat Programs in Agriculture and Business at the Harvard Business School was announced January 20, was substituting on the N.C.A. Convention program

Convention Issue

This issue of the INFORMATION LETTER is devoted to the proceedings of the 47th Annual Convention of the National Canners Association, in Atlantic City, January 23-27.

This 100-page issue compares with the previous record-size 96-page book published in 1953, and was in the mail within 10 days after the close of the Convention.

for Secretary of Agriculture Ezra T. Benson. Mr. Benson was prevented from appearing because of the pressures of the farm legislation program.

Mr. Davis said he considered it important that the 47th Annual N.C.A. Convention was giving prominence to a discussion of marketing. "The canning industry and, in fact all agriculture, is faced today with the job of doing something about marketing. We have learned a great deal about the job of production and all its difficulties, but we have not kept pace in finding new and expanded markets for all the products we have perfected. American consumers continue to demand and buy increased services and increased processing of food products. Apparently, consumers want food products as nearly ready to eat as possible and industry is moving further and further into the field of food processing. The farmer is dependent upon the processor for a market in many instances and the processor must depend upon the farmer for the raw material. We have many problems, but the big job ahead is to develop, improve, expand, and broaden our markets, both domestic and foreign."

Other features of the general sessions were the presentation of official Convention resolutions by Chairman Henry P. Taylor of the Resolutions Committee; the nomination and election of 1954 officers and directors on the slate offered by Chairman Herbert J. Barnes; and the sessions closed with the installation of new officers and the presentation to President Ratzesberger of a motion picture projector and screen in a gracious speech by Past President Fred C. Heinz.

(Please turn to page 108)

CARLOS CAMPBELL

Executive Secretary and Treasurer

E. E. Willkie Elected 1954 President of N.C.A.; George B. Morrill, Jr., Vice President; Directors Chosen

E. E. Willkie, president of Pacific American Fisheries, Inc., Bellingham, Wash., was elected 1954 President of the N.C.A.

He succeeds Louis Ratzesberger, Jr., president of the Illinois Canning Co., Hoopeston, Ill.

George B. Morrill, Jr., vice president of Burnham & Morrill Co., Portland, Me., was elected 1954 Vice President.

Carlos Campbell of Washington, D. C., was continued in office as Executive Secretary-Treasurer.

The N.C.A. membership elected 26 Directors to new terms; the terms of 46 members of the Board of Directors were held over.

E. E. WILLKIE

1954 President

E. E. Willkie

Mr. Willkie graduated from the U. S. Naval Academy in 1921. While at the Academy he was a member of the United States Olympic Wrestling Team and participated in the games in Antwerp. Following services as an ensign in the Navy, Mr. Willkie went to work as a chemist for Libby, McNeill & Libby at the Morrison, Ill., factory in 1923. He was promoted to foreman of the Sheridan, Mich., plant and in 1926 became superintendent of the plant in Leer, Germany. There followed other European assignments, in Belgium in 1929 and Antwerp in 1931.

After 12 years in Europe, Mr. Willkie returned to the United States and began his first year with Libby in Chicago. In 1939 he was made vice president in charge of all operations east of the Rockies, Europe and Alaska, and became a director of the Libby organization in 1945.

In 1952 he was made president and director of Pacific American Fisheries, Inc., and on January 1, 1953, also became president and director of Cedargreen Frozen Pack Corporation, both at Bellingham, Wash.

Mr. Willkie has had wide experience in association work. He was president of the Evaporated Milk Association, 1945 and 1946. Since 1945 he has served on many N.C.A. committees —Resolutions, Fishery Products, Public Relations, Home Economics, Convention, War Mobilization. He served as an N.C.A. Director from 1949 to 1952 and has been a member of the Administrative Council since 1949.

George B. Morrill, Jr.

George B. Morrill, Jr., is a third generation member of the family that helped to found the Burnham & Morrill Company over 100 years ago.

After finishing at Yale University, he worked for two years in the research department of the American Can Company in Chicago.

On entering Burnham & Morrill, he worked first in manufacturing and later spent five years in sales work. He entered the general management of the firm in 1948 as a vice president. He has been a director of the company since 1937.

Mr. Morrill has served two terms in the Senate of the State of Maine, 1943-47; and also two years as president of the Maine Canners Association, 1952-53.

In 1946 Mr. Morrill was elected to a three-year term on the N.C.A. Board of Directors and also served on the Board Apportionment Committee, whose recommendations are the basis for the present Board structure. He also was a member of the Executive Committee, 1946 and 1947.

Mr. Morrill has served on the Convention Committee continuously since 1948 and was its chairman in 1951.

He also was a member of the Finance Committee and Administrative Council in 1952.

Annual Reports

Copies of the *Secretary's Annual Report, 1953*, and the *Annual Report of the Research Laboratories, 1953*, have been mailed to the headquarters office of each member.

N.C.A. Board of Directors

At the annual meeting, the N.C.A. membership elected 46 to three-year terms on the Board of Directors. Together with 26 holdover members, following is the Board as now constituted:

Directors Elected for Three-year Terms

Charles Alhadeff, Whiz Fish Products Co., Seattle, Wash.

W. E. Beach, McKeon Canning Co., Inc., Burbank, Calif.

A. M. Erickson, Barron-Gray Packing Co. Div., Hawaiian Pineapple Co., Ltd., San Jose, Calif.

Thomas E. Evans, Reinbeck Canning Co., Reinbeck, Iowa

Peter Filice, Filice and Perrelli Canning Co., Inc., Richmond, Calif.

Walter Friend, Friend Bros., Inc., Melrose, Mass.

W. T. Dixon Gibbs, Gibbs & Co., Inc., Baltimore, Md.

Percy W. Gould, Franklin Farms Products Co., Farmington, Maine

John Hauser, The C. H. Musselman Co., Biglerville, Pa.

John C. Hemingway, H. C. Hemingway & Co., Auburn, N. Y.

W. D. Hooper, Hunt Foods, Inc., Fullerton, Calif.

F. Lowden Jones, Walla Walla Canning Co., Walla Walla, Wash.

Leon C. Jones, J. R. Simplot Co., Caldwell, Idaho

L. M. Jones, Washington Canners Cooperative, Vancouver, Wash.

Glenn Knaub, P. J. Ritter Co., Bridgeton, N. J.

Ray Krier, Krier Preserving Co., Belgium, Wis.

James B. Lane, Westgate-California Tuna Packing Co., San Diego, Calif.

Claude Mershon, Fosgate Citrus Concentrate Coop., Orlando, Fla.

R. A. Moss, Woods Cross Canning Co., Clearfield, Utah

George O. Robey, Kemp Bros. Packing Co., Inc., Frankfort, Ind.

John Seuerth, Gerber Products Co., Fremont, Mich.

William B. Swonger, The St. Mary's Packing Co., Sidney, Ohio

M. K. Tescher, Kuner-Empson Co., Brighton, Colo.

G. A. Turmail, Bluffton Foods, Inc., Bluffton, Ind.

Andrew Washburn, A. Washburn & Sons, Bloomington, Ill.

S. G. Wimmer, S. G. Wimmer & Son, Christiansburg, Va.

Directors Whose Terms Hold Over

Joseph F. Barker, The Utah Canning Co., Ogden, Utah

C. F. Burhans, Jr., Lakeland Highlands Canning Co., Inc., Highlands City, Fla.

Fred C. Bush, Bush Brothers & Co., Dandridge, Tenn.

William E. Butterfield, Butterfield Canning Co., Muncie, Ind.

Berkeley A. Davis, Rogers Canning Co., Milton, Ore.

Hamilton C. Davis, Walnut Creek Canning Co., Walnut Creek, Calif.

George Davison, Foster Canning, Inc., Napoleon, Ohio

George H. Draper, III, Draper Brothers, Inc., Frederica, Del.

John E. Dodds, Schuckl & Co., Inc., Sunnyvale, Calif.

Edward R. Elwell, Burnham & Morrill Co., Portland, Maine

Samuel E. W. Friel, S.E.W. Friel, Queenstown, Md.

John E. Frost, Delta Canning Co., Inc., Raymondville, Texas

Leo M. Gleason, G & M Food Products, Des Moines, Iowa

George Gooding, California Packing Corp., San Francisco, Calif.

Henry W. Hartle, Owatonna Canning Co., Owatonna, Minn.

J. William Hathaway, Hathaway Bros., Columbia Falls, Maine

Karl A. Hirzel, Hirzel Canning Co., Toledo, Ohio

T. B. Holcombe, Indian Ridge Canning Co., Inc., Houma, La.

Grover Howard, Baron Canning Co., Westville, Okla.

Marvin H. Keil, Green Giant Co., Beaver Dam, Wis.

Ralph Keller, George A. Hormel & Co., Chicago, Ill.

Charles O. Koller, Charles G. Summers, Jr., Inc., New Freedom, Pa.

Edwin C. Kraus, Big Stone Canning Co., Ortonville, Minn.

George Lambert, Keystone Mushroom Co., Inc., Coatesville, Pa.

Elton Lasselle, Portland Canning Co., Inc., Sherwood, Ore.

R. C. Lewis, Bordo Products Co., Winter Haven, Fla.

J. F. McIntosh, Baldwin Packers, Ltd., Lahaina, Maui, T. H.

F. J. McQuaid, John W. Taylor Packing Co., Hallwood, Va.

A. N. Meyer, Fredonia Canned Foods, Inc., Fredonia, Wis.

W. Ennis Parker, Pomona Products Co., Griffin, Ga.

George Pierce, Fairmont Foods, Inc., Barker, N. Y.

A. J. Rogers, Cherry Growers, Inc., Traverse City, Mich.

D. T. Saxby, California Packing Corp., San Francisco, Calif.

Robert E. Searby, Hawaiian Canneries Co., Kapaa, Kauai, T. H.

Richard Schlecht, Rossville Packing Co., Rossville, Ill.

George C. Seybolt, Wm. Underwood Co., Watertown, Mass.

P. K. Shoemaker, H. J. Heinz Co., Pittsburgh, Pa.

G. Bartol Silver, Charles B. Silver & Son, Havre de Grace, Md.

Victor R. Smith, Box Elder Packing Corp., Brigham City, Utah

Vance F. Sutter, Fidalgo Island Packing Co., Seattle, Wash.

Donald E. Tobin, Victor Preserving Co., Ontario, N. Y.

Marcus Urann, National Cranberry Association, South Hanson, Mass.

A. O. Verbeke, Libby, McNeill & Libby, Chicago, Ill.

F. H. Walrond, Manteca Canning Co., Manteca, Calif.

D. B. Wood, Wood Canning Co., Stockton, Calif.

Fred T. Wright, Beaver Valley Canning Co., Grimes, Iowa

1954 Finance Committee

The personnel of the Finance Committee was approved at the General Session. As announced by President Willkie, it is as follows:

Louis Ratzesberger, Jr., Illinois Canning Co., Hoopeston, Ill., *Chairman*

H. J. Barnes, Kaysville Canning Corp., Kaysville, Utah

John L. Baxter, H. C. Baxter & Bro., Brunswick, Me.

E. B. Cosgrove, Green Giant Co., Le Sueur, Minn.

Howard T. Cumming, Curtice Brothers Co., Rochester, N. Y.

S. B. Cutright, Illinois Canning Co., Hoopeston, Ill.

Clinton W. Davis, Portland Packing Co., Portland, Me.

Ralph O. Dulany, John H. Dulany & Sons, Inc., Fruitland, Md.

William A. Free, Sr., Hungerford Packing Co., Inc., Hungerford, Pa.

Dan Gerber, Gerber Products Co., Fremont, Mich.

Walter L. Graefe, Pomona Products Co., Griffin, Ga.

G. Sherwin Haxton, Haxton Foods, Inc., Oakfield, N. Y.

Fred C. Heinz, H. J. Heinz Co., Pittsburgh, Pa.

W. U. Hudson, Gerber Products Co., Oakland, Calif.

Marc C. Hutchinson, Michigan Fruit Canners, Inc., Fennville, Mich.

Adalph C. Ketzler, Bordo Products Co., Chicago, Ill.

H. F. Krimendahl, Stokely-Van Camp, Inc., Indianapolis, Ind.

MEETING OF N.C.A. DIRECTORS

N.C.A. Board Approves Consumer Relations Program, Authorizes Other Activities Beneficial to Industry

The Board of Directors of the National Canners Association held its Convention meeting in Atlantic City, January 22, and took action—

Approving the recommendation of the Administrative Council for a 1954 budget of $1,150,356 plus another $150,000 from the 1953 surplus to finance expanded activities of the N.C.A. in the field of consumer relations.

Continuing the current rate of N.C.A. dues.

Approving another Council recommendation appropriating $6,000 to publish a Laboratory manual, this amount constituting an advance against receipts expected from sale of the manual when completed.

Authorizing the Association to cooperate actively with the Florida Canners Association in contesting the petition to deprive the Florida citrus canning industry of the 7(b)(3) wage-hour exemption.

Authorizing $5,000, also on recommendation of the Council, for travel of Laboratory technicians who will assist the Federal Civil Defense Administration in testing effects of atomic explosions on canned foods and to cover expenses of a report on such tests.

Approving the appointment of Arbitration Boards for 1954.

Continuing the following Special Committees of N.C.A.: Conference, Convention, Procurement, Chemical Additives.

The Board heard a report by Hamilton Carothers of the Office of Counsel on state laws and regulations. He reviewed the problems arising from ill-considered and hastily-devised state legislative enactments, and the difficulties of coping with them because of limitations of time and travel expense and the complications of dealing with many different jurisdictions.

Mr. Carothers suggested three possible approaches to the problem:

(1) Passage of like bills in each of the 48 jurisdictions. Some states, he said, have local statutory provisions which declare that any food complying with the federal standards of identity and quality for that product shall be considered in compliance with the local food regulation laws.

(2) A possible amendment to the federal act limiting the power of state jurisdictions to vary or add to the provisions of federal standards.

(3) A test case on a selected set of facts with the hope of obtaining a definitive Supreme Court decision on the respective areas available for state and federal regulation.

Mr. Carothers suggested that the members think over these problems, and he requested comments or inquiries or recommendations.

The afternoon session of the Board was featured by three main presentations, all of which are reproduced in full elsewhere in this issue:

(1) The address by H. Thomas Austern, Chief Counsel of the Association, on the Washington scene, highlighting among other things, important phases of President Eisenhower's budget message which had been delivered in Washington the day before Mr. Austern spoke.

(2) The report by W. A. Free, Sr., chairman of the Special N.C.A. Committee to Investigate Ways and Means of Promoting Increased Public Acceptance of Canned Foods, which recommended appropriation of $150,000 and the employment of professional counsel to assist in extended consumer relation activities by N.C.A.

(3) The presentation by George Anderson, partner in the public relations firm, Dudley, Anderson & Yutzy, of the outline of such a consumer relations and canned foods promotion program.

The program and the committee recommendations were unanimously approved and authorized by the Board.

WILLIAM A. FREE, Sr.

D. P. Loker, Star-Kist Foods, Inc., Terminal Island, Calif.

R. G. Lucks, California Packing Corp., San Francisco, Calif.

John F. McGovern, Green Giant Co., Le Sueur, Minn.

Ivan Moorhouse, Olympia Canning Co., Olympia, Wash.

George B. Morrill, Jr., Burnham & Morrill Co., Portland, Me.

Fred M. Moss, Idaho Canning Co., Payette, Idaho

Maxwell N. Naas, The Naas Corp. of Indiana, Portland, Ind.

Robert C. Paulus, Paulus Bros. Packing Co., Salem, Ore.

E. N. Richmond, Richmond-Chase Co., San Jose, Calif.

Emil Rutz, Schuckl & Co., Inc., Sunnyvale, Calif.

R. L. Smith, Kuner-Empson Co., Brighton, Colo.

Henry P. Taylor, Taylor & Caldwell, Inc., Walkerton, Va.

A. O. Verbeke, Libby, McNeill & Libby, Chicago, Ill.

H. L. Wedertz, Lakeside Packing Co., Manitowoc, Wis.

Frederick R. Weisman, Hunt Foods, Inc., Fullerton, Calif.

J. B. Weix, Oconomowoc Canning Co., Oconomowoc, Wis.

Oliver G. Willits, Campbell Soup Co., Camden, N. J.

E. B. Woodworth, Hawaiian Pineapple Co., Ltd., San Francisco, Calif.

Ray A. Yocom, Reid Murdoch Div., Consolidated Food Processors, Inc., Chicago, Ill.

Call for 1954 Directory Copy

Questionnaire forms on which canners are asked to submit information for the compilation of the 1954 edition of the *Canners Directory* were mailed to all canners on January 26, and should be on canners' desks when they return from the Convention. These forms should be filled out and returned promptly to the N.C.A. in the self-addressed, postage-paid envelopes provided.

As in past editions, the 1954 *Canners Directory* will list the name and main office address of each canning firm, location of factories operated by each firm in each state, and the canned food products packed by each firm within each state. Canners are asked to list the states and the cities and towns in which their canning plants are located, and to identify their products according to instructions in the questionnaire.

Report of the Special Committee To Investigate Ways and Means of Promoting Increased Public Acceptance of Canned Foods

By William A. Free, Sr., Chairman

Last year when our National Canners Association convened in Chicago, Roy G. Lucks, president of California Packing Corporation, and myself were asked to speak to the Convention concerning "The Indispensability of Production-Management Direction." Mr. Lucks was asked to speak from the viewpoint of the large canner, and myself, from the viewpoint of the small canner.

In the course of his address, Mr. Lucks stated, "Consumer acceptance of canned foods is imperative if the industry is to progress. . . . Today the industry is offering the consumer a better quality of canned foods, in greater volume, and at a relatively lower price than ever before. . . . There is a story to be told in this connection which has never been adequately developed. We must increase our effort to tell the story of our products and the importance of the processors' function in the economy of the nation. To do this is the responsibility of the entire industry and a challenge to all of us."

During my talk I posed the following question: "Is it not time that Mrs. Consumer be told and retold the facts about canned foods through some sort of Association effort? Is it too much to ask our National Canners Association to investigate the feasibility and interest that might be manifest throughout its membership? This should not be the question of the small canner alone—the large canner would proportionately share in the resultant increased consumption of our products through a full and properly conducted endeavor. How else can small canner and large canner alike participate in an industry-wide effort of telling the merits of, the goodness of, and the economy of canned foods except through the N.C.A. spearhead? Is it worth looking into?"

At the close of my address I announced to the Convention assembled that the day before, Mr. Lucks, myself and many others discussed this topic for an hour and a half before the Administrative Council and that the Council unanimously passed a motion recommending to the Board the appointment of a special committee to investigate ways and means of promoting increased public acceptance of canned foods, such committee to make a report and recommendations to the Board of Directors. The Board approved the recommendation of the Council and concurred.

So much for the background.

President Ratzesberger, as instructed by your Board, appointed the following members to that committee:

William A. Free, Sr., Hungerford Packing Co., Inc., Hungerford, Pa., *Chairman*

K. F. Boucher, Hawaiian Pineapple Co., Ltd., San Francisco, Calif.

A. E. Brown, Michigan Fruit Canners, Inc., Benton Harbor, Mich.

Edward Dunlap, Plymouth Canning Co., Inc., Plymouth, Ind.

Dan Gerber, Gerber Products Co., Fremont, Mich.

Fred C. Heinz, H. J. Heinz Co., Pittsburgh, Pa.

E. A. Hildreth, National Fruit Product Co., Inc., Winchester, Va.

K. M. Ingison, Fruit Belt Preserving Co., East Williamson, N. Y.

Glenn Knaub, P. J. Ritter Co., Bridgeton, N. J.

John P. Kraemer, Mammoth Spring Canning Co., Sussex, Wis.

Roy G. Lucks, California Packing Corp., San Francisco, Calif.

Norman Merrill, Blue Lake Packers, Inc., Salem, Ore.

Fred Moss, Idaho Canning Co., Payette, Idaho

Louis Ratzesberger, Illinois Canning Co., Hoopeston, Ill., *Ex Officio*

Emil Rutz, Schuckl & Co., Inc., Sunnyvale, Calif.

A. O. Verbeke, Libby, McNeill & Libby, Chicago, Ill.

Oliver G. Willits, Campbell Soup Company, Camden, N. J.

Work of the committee was started immediately by correspondence and phone calls and the full Committee had its first meeting together in Washington at N.C.A. headquarters on May 21, 1953. The Committee made a progress report to the Board and the Board then directed the Committee to conduct consumer research analysis to establish opportunities for sound marketing expansion as the first step in carrying out the original mandate of the Board.

With the work getting into full swing, N.C.A. staff members were alerted to certain phases of consumer research and compilation of known factors at hand. Dr. H. L. Stier and other staff members of N.C.A. were commissioned to make analyses and studies of these surveys.

In addition, several N.C.A. members made other data of this nature available from their own files.

The staff analyzed about 70 surveys on the marketing of canned foods. It was revealed from the summary of these anlyses that certain information needed by the Committee had not been obtained in a satisfactory manner by these market surveys. Consequently, a special market survey was authorized to obtain more detailed information on the number of consumers using canned foods, the frequency of use, and in addition the reasons why canned foods are not used more frequently or, in the case of non-users, why they do not use canned foods at all.

The report of this special marketing survey will be presented on the Convention program tomorrow afternoon by Ray Robinson of the Crowell-Collier Publishing Co. The Committee has had the benefit of a preview of these findings about consumer reactions to canned foods.

While Dr. Stier was engaged in the analyses and compilation of the many surveys, it was felt by President Ratzesberger that the work at hand could be more rapidly activated by appointment of a subcommittee, made up of individuals who in their respective firms are occupied specifically with promotion, merchandising and consumer relations activities. This subcommittee was appointed and went into immediate action. Members are:

K. F. Boucher, *Chairman*, and Milton E. Brooding, W. A. Free, Fred C. Heinz, Louis Ratzesberger, Henry Stevens, Alfred Stokely, and A. O. Verbeke.

This subcommittee met in Chicago October 29 and 30 and thoroughly plumbed the thinking of each individual member as to how to satisfy the objectives as set out by the Board.

The subcommittee started out with chart evidence presented by Dr. Stier that a problem really exists. The group felt unanimously that these surveys are of such value as to warrant their being prepared for distribution to the membership of N.C.A. for individual use, as well as Committee guidance. Some of these surveys are of special value because they explore the reasons why housewives do or do not use canned foods.

After thorough discussions, a half dozen or so proposals were made. Briefly, some of these were:

A universal selling slogan

A canning industry film

A contest among food editors and students

Various types of school educational programs

Canned foods publicity directed to the grocery trade

Stimulation of canned foods use through home storage facilities thus creating impulse eating in the home. And there were many others.

These were considered in full and careful detail, and while each of these

points has merit within itself, the Committee felt that no one of them covered the whole problem, and decided that it must think in terms of the over-all problem rather than to suggest a list of ideas attacking separate parts of the problem.

The subcommittee therefore came to the conclusion that consideration of any of these suggestions, or the over-all problem, for that matter, would require professional skills beyond that possessed by anyone on the committee.

A basic recommendation was unanimously agreed upon, namely, to consider hiring an outside organization of professional experts in consumer relations to consider our objectives and to present ways to reach them.

There was constant correspondence and communication between individual Committee and subcommittee members and the N.C.A. staff on this problem throughout the month of November. The Committees came together again in executive session at N.C.A. headquarters on November 29 and 30.

The first order of business was the interviewing of representatives of professional organizations that had been contacted on this problem, and it was the recommendation of the subcommittee to the over-all Committee that the services of the firm Dudley, Anderson & Yutzy be engaged. The over-all Committee, after hearing Mr. Anderson, concurred in the recommendation to employ his firm to prepare a program of consumer-relations activity and publicity designed to promote increased public acceptance of canned foods for presentation to the Board at this meeting.

Your entire Committee met yesterday, discussed its work during the past year, and heard the program formulated by Dudley, Anderson & Yutzy. It was the unanimous opinion of your Committee that the program be adopted.

I want to show you that program now, but before doing so, I think I should tell you something about Dudley, Anderson & Yutzy, the professional counsel we commissioned to formulate this program for Board consideration.

Dudley, Anderson & Yutzy, better known as DAY, is a New York firm which has specialized in the supervision of marketing and merchandising activities for many years. This firm has a long record in food publicity and serves a distinguished list of clients, some of which are:

The American Meat Institute, Florida Citrus Commission, American Molasses Company, Brazil Nut Association, Knox Gelatine Company, Nestle Chocolate Company, McIlhenny Company (Tabasco Sauce), Parafined Carton Research Council, United Fruit Company, and in nonfood fields they are serving: The Aluminum Association, Magazine Publishers Association, The Readers' Digest, The American Telephone & Telegraph Company, and certainly there are others.

Your committee was greatly impressed by the character of this firm's accounts, and, also, by the fact that this firm has never lost an account and has never had one of its programs discontinued because of lack of performance.

Mr. George Anderson of DAY will now present the program he has developed. *(Mr. Anderson's report is reproduced beginning on page 18.)*

Ladies and gentlemen of the Board, I am sure you will agree that Mr. Anderson has presented a program that will fill a long-felt need of expanded Association endeavor, one that will carry out the mandate laid down by your Board to this Committee, a program that will go a long way to increasing the public acceptance, to a greater degree than ever before, of the products you pack.

While no financial obligations have been assumed by your Association up to now, I must tell you that based on the judgment of individual experienced members of your Committee and the judgment of all of the professional counselors interviewed, the Committee believes that an investment in this effort should be not less than $100,000 and, at present, not more than $200,000. Your Committee recommends to this Board that an initial year's budget be approved in the area of $150,000 to implement and activate an adequate consumer relations program.

Ever since the talks at last year's Convention, the affirmative action taken by your Board and the subsequent appointment of your Committee, the eyes of the food world have been focused on the National Canners Association.

You have all read the many articles written in the trade press, both production and distribution, on this subject. You have all read and heard the progress reports given at many of the state canners conventions by President Ratzesberger on this subject. Our Executive Secretary, Carlos Campbell, stated last month in Columbus, Ohio, that competition of other foods is providing a challenge to the canners and that the share of the consumer dollar spent on canned food depends on us.

A typical letter from a member of N. C. A., a successful canner of long standing, and an astute merchandiser, came to me only recently, and I quote from it:

"There is no question in mind, but that if the National Canners Association is going to continue to prosper and attract the attention of the greater number of our canners, large and small alike, we've got to show proper leadership and that is going to come forth only provided we will prove to these canners that we have a definite interest in doing a bigger and better job of acquainting the great American public and the family with facts about canned foods. We have to reach out and be more aggressive. We have to take the offensive; we can no longer stand idly by and be on the defense."

The program suggested by your Committee and my announcement that it will require in the area of $150,000 to implement and activate, I must admit, is a bit different from most reports presented to this Board. Although it is a deviation from the ordinary, let me remind you that the stated objectives of the National Canners Association are (1) to increase the use of canned foods, and (2) to improve the efficiency of operation of its members.

Roy Lucks, in his address to the Convention last February in Chicago, made this profound observation: "The members of this industry must be sufficiently flexible to adjust themselves to changes if they want to survive. So it is that the Association which serves these members must also be flexible and subject to changing the emphasis on its activities."

Ladies and gentlemen of the Board, you have heard the special Committee's report, which is now entered into the records of this meeting. President Ratzesberger, I would like to read a resolution prepared by our Committee and I hope some member of this Board will move its adoption:

Resolved, that the recommendation of the Special N. C. A. Committee to Study Ways and Means of Increasing the Public Acceptance and Use of Canned Foods be approved, that the recommended one-year appropriation of not more than $150,000 to finance the program for 1954 be made, that the Executive Secretary be authorized and directed to develop within the Association an appropriate staff organization to administer the program, and that the officers of the Association be authorized to employ the firm of Dudley, Anderson & Yutzy to assist the Association in carrying out the developed program and that the sum of $150,000 be taken for this purpose from the surplus of the Association.

Continuing Consumer Relations and Marketing Program

**By George Anderson,
Dudley, Anderson & Yutzy**

In December, 1953, Dudley, Anderson & Yutzy was commissioned to prepare a program designed to accelerate and maintain canned foods consumption. Intensive investigation and exploration of the problem since that time has corroborated the evident statistical facts—that the canned foods industry as a whole is in a healthy condition.

The objective of the program, then, is not to "put out a fire" but to strengthen the industry's position in the market place and to create in the consumer or housewife a lasting awareness and appreciation of canned foods in the daily buying and preparation of meals in her home.

The Seven Virtues of Canned Foods

The beginning of any sound consumer relations program must be an analysis of the product itself . . . the virtues or characteristics that warrant consumer interest and purchase. These virtues must be the foundations upon which the program is built, the desirable characteristics that through constant exposure must be linked with the product until the consumer has an automatic attitude and preference for the product . . . in this case canned foods in general.

Among others, canned foods have these seven basic virtues: economy, nutrition, variety, availability, safety, convenience, time-saving.

What Is the Present Consumer Attitude Toward Canned Foods?

Indications are that the housewife is vaguely aware of all seven virtues or reasons for buying canned foods . . . is definitely aware of their convenience and time-saving.

This fact is specifically borne out by the rapid and constant increases in sale of products such as canned meats and concentrated orange juice. It is generally borne out by the most recent study of consumer buying habits of canned foods which show that the younger housewife today buys more canned foods than the older housewife.

Recent U. S. Department of Commerce statistics show that 49.8 percent of women under the age of 35 work full time; 25 percent of all women work at least part of the time. We believe this is the answer, in large part, to the historically-unusual situation of the younger housewife accounting for a major segment of canned foods purchases.

The working housewife just doesn't have time. She buys canned foods primarily because they are time-saving and convenient to use. Conversely, the older housewife is not faced with the pressure of time-saving; has the opportunity to freely exercise her attitudes and conditioned preferences in selection of foods for her family.

Canned Foods Have No Prestige!

One all-important element is lacking in industry consumer relations. Canned foods have no prestige.

Canned foods are not served proudly. They are served because they are convenient and time-saving. This same attitude is reflected by restaurants and hotels. Few, if any, proudly list canned foods on their menus.

Canned foods are not considered by the consumer to be quality foods. They are convenient foods.

A Prestige Consumer Relations Program For Canned Foods

It is our recommendation that in building greater consumer acceptance and purchase of the canning industry's products there must be a consumer relations program to clothe canned foods with prestige.

We are indeed fortunate that the industry's products are convenient and time-saving and that for these reasons there is little resistance on the part of the younger housewife. But does she serve canned foods to her guests at Sunday dinner as she uses them during the working week? Does the older housewife buy fewer canned foods because she is ashamed of being a "can opener cook"?

We think so. A program designed to build prestige into the seven canned food virtues can strengthen the housewife's attitude in favor of canned food at the point of sale and result in increased purchases of the canning industry's products.

Prestige Program Themes

The themes of a canned foods prestige program are endless; should stress the industry's continuing research and product development; the role of canned foods in the American way of life; the importance of the canning industry in the nation's food and agricultural economy. But spearheading and dominating the program in its continuing development should be the fact that the canning industry provides a servant in every home.

There has been only one instance of consumer exposure to this theme during the past two years. This quotation from an article in *Cosmopolitan Magazine* in January, 1952, best expresses the objective:

"Symbol of the new-style gourmet-cook is the can opener. At one time a badge of shame, hallmark of the lazy lady and the careless wife, today the can opener is a magic wand. The new gourmet . . . you and you . . . looks at it this way: Other people have the responsibility for the selection, cleaning and preliminary preparation of my raw materials. When I ply my busy little can opener, I move onto the scene as a chef does after a corps of kitchen helpers have done the scullery chores. Armed with a can opener, I become the artist-cook, the master, the creative chef."

The canning industry needs more and more of this in every magazine and newspaper, on every television and radio station in the country. Projection of this theme should be a continuing activity in conduct of the prestige program.

The National Canned Foods Conference

We recommend, also, the creation of the National Canned Foods Conference, starting with 1955. This will be a prestige-building yearly meeting of the canning industry with about 200 food editors from leading national, sectional and farm magazines, newspapers and national press syndicates, local and network television and radio broadcasters.

The National Canned Foods Conference would be held annually in conjunction with the National Canners Convention in whatever city the Convention occurs. If the Convention continues to alternate between Atlantic City and Chicago, it would provide an opportunity for attendance by eastern and national consumer opinion leaders one year and western and national the next year.

The program of the National Canned Foods Conference would be a combination of lectures by industry experts and panel discussions of industry spokesmen with selected food leaders. Sessions could include:

The history and romance of the canning industry.

The canning process . . . from seed to can, including a guided tour of Canning Machinery and Supplies Association exhibits.

A product cutting and quality session.

Contributions of the canning industry to the historical growth and development of the United States.

Newest nutritional research findings presented by N.C.A. scientists.

Consumer attitude toward quality, flavor, convenience, can sizes, economy, etc.

The National Canned Foods Conference would comprise at least one day of lectures and panel discussions peaked with a gourmet canned foods luncheon which would demonstrate the prestige theme of the consumer relations program . . . a giant, great sounding board.

Conference membership would be drawn from the many builders of consumer attitude and action, in the field of national magazines, Sunday

supplements, sectional and special magazines, farm magazines, professional magazines, national press syndicates, newspapers, and leading television and radio commentators.

What Is Today's Retailer Attitude Toward Canned Foods?

An integral part of any consumer relations program is analysis and action at the point of sale.

No matter how well the consumer is indoctrinated, if the product is not readily available and adequately displayed in variety at the point of sale, neither the final action of planned purchase nor the emotional reaction of impulse buying happens.

To strengthen the canned foods position in the market place and to create a healthy climate for canned foods at the point of sale is the accompanying objective of our over-all consumer relations program.

Details of our research and recommendations follow.

Where Are Canned Foods in Today's Retail Revolution?

We are witnessing a very real revolution in food distribution and in retail store operation, a revolution that requires day-to-day defense of your products, your production and distribution methods, and your consumer franchises.

There has been a tremendous increase in the number of items sold in today's modern super market. Super Market Institute reports minimum inventories of 3,000 items per store, up to 8,000 for the largest outlets.

Shelf space devoted to canned foods has been shrinking for the past 20 years. Recently IGA, in the blueprints for 37 of their newest and most modern super markets under construction, allowed only 10 percent of floor space for canned foods.

Shelf location of canned foods is suffering from the inroads of higher gross profit specialty items and from the constant high-pressure merchandising efforts of the manufacturers of competing items.

Too much emphasis has been placed on sales per square foot, profit per square foot, gross profit, and misleading sales turnover figures. There is a serious lack of accurate net profit information about canned foods among your retail customers.

In today's retail revolution, there is no interest in promoting canned foods.

What Is Happening Among Distributors?

In the distributor field, particularly, the addition of nonfood items, specialties and new food products has caused a financial squeeze on your customers and their ability to carry adequate inventories of all items. Operating capital established in 1940 cannot fill 1954's needs.

Lack of canned food merchandising has meant more hand-to-mouth buying and the resulting "out of stock" situation and lost sales.

What Is the Situation Among Brokers?

Recently it was reported that 75 percent of the so-called food brokers now handle nonfood items, and more importantly that at least 20 percent of their income is derived from nonfood sales.

And this figure is not static. The trend is toward adding more and more nonfood items, resulting in less and less sales time devoted to canned foods.

What Are Current Trade Trends Which Affect Canned Foods?

From Fairchild Publications comes a national research project which reveals the attitudes of retailers in planning their 1954 merchandising programs. It shows where they plan to allocate less store space and what items they plan to expand in both inventory and store shelf space. Here is a digest of the findings:

Less space: coffee, soap and detergents, canned vegetables, canned juices, baby foods, canned milk, canned fruits.

More space: frozen foods, paper products, household supplies, candy and gum, pet foods.

A Marketing Program for Canned Foods

It is our recommendation that a marketing and merchandising program be conducted concurrently with the consumer relations program to build interest in canned foods in trade channels. This would be trade relations in its purest form, not built around promotion of a specific product but designed to establish a better, or the right, atmosphere in which to do business. Establishing a better climate for selling canned foods will improve the industry's relations with all segments of the trade.

A marketing and merchandising program will create greater interest in canned foods, their inherent qualities and consumer benefits, and more cooperation in their merchandising and display.

Such a program will provide your customers in the food trade complete, adequate, and correct information about canned foods. It will improve the attitudes and opinions of distributors and retailers about your industry and your products.

Components of an Effective Marketing and Merchandising Program

In the first place, a broad educational program at all levels of distribution is needed. This should include a prestige campaign in the trade similar to the consumer relations program.

A cooperative program of sales training and merchandising information about canned foods at the retail store level is needed. We recommend that this be done with the help of operational committees from customer industries which would serve as a sounding board and planning group to advise in N.C.A. merchandising activities.

Also required is the collection and distribution of accurate, detailed and correctly analyzed information about canned foods. This should be disseminated on a continuing basis through manuals, brochures, portfolios, handbooks, broadsides and other material on canned foods and their marketing and merchandising potentials.

How Can the Entire Broker, Distributor and Retail Fields Be Covered?

A tremendous source of manpower is already available and waiting to be organized and armed with material to tell the story of the canned foods industry. Thousands upon thousands of sales representatives and brokers can be joined together in the common interest and with the common goal of improving the industry's position and helping to create a better climate for canned foods in the market place now and in the future.

The retail food field numbers some 500,000 outlets, but the great bulk of retail sales—80 percent, in fact—are made in only 20 percent of these stores. Around this hard core of retail volume can be built an effective canned foods marketing and merchandising program and on a national basis.

Trade studies have revealed that even further refinements can justifiably be made by working with the 16,000 super markets in the country which are the leaders in sales development, marketing and merchandising. These 16,000 key retailers will help establish patterns of canned food merchandising which can be applied throughout the entire retail field.

Continuing success of an effective marketing and merchandising program will require facilities of a highly specialized nature. Such facilities should include a field force of merchandising and marketing representatives who are regularly in contact with the retail food trade; sound and friendly working relationships especially with large volume distributors; broad retail marketing experience with canned foods and other grocery store products; recognized authority in the field of marketing research and sales analysis; and a record of proven performance in the successful merchandising of canned and packaged food products.

Recognizing the importance of having access to such highly specialized

facilities in connection with its work for important clients in the food and grocery industry, Dudley, Anderson & Yutzy arranged a working relationship with the established merchandising and marketing firm of Don White, Inc. For N.C.A. this activity will be personally planned and supervised by Don R. Callahan, head of DAY'S marketing and merchandising service.

Having pioneered in food and grocery merchandising, audited features and marketing research, Don White, Inc. today operates nationally, with merchandising representatives in 137 of the most important trading areas in the United States, areas which account for $15 billion or 38 percent of total U. S. food and grocery retail sales.

This organization and its field representatives are in regular working contact each month with large-volume food and grocery chains, voluntary and cooperative groups and independent retailers in connection with display, merchandising, sales testing and research for some of the best known brands of leading U. S. processors and manufacturers.

A 14-Point Plan of Immediate Action

(1) Launch a continuing consumer relations program to clothe canned foods with prestige.

(2) Begin a continuing consumer relations program to strengthen appreciation of canned foods' economy, nutrition, variety, time-saving, safety, availability and convenience.

(3) Create the National Canned Foods Conference as part of the 1955 N.C.A. Convention program.

(4) Appoint an operations committee from the National Association of Retail Grocers, National Food Brokers Association, National Association of Food Chains, National Association of Wholesale Grocers, Super Market Institute, U. S. Wholesale Grocers Association, and the voluntary and cooperative groups.

(5) Activate a national marketing research organization to obtain accurate information from the trade.

(6) Prepare a merchandising manual based on research and on counsel of the operations committee.

(7) Arm N.C.A. members' sales representatives and brokers with the manual and other merchandising materials.

(8) Inaugurate a continuing prestige publicity program in the trade press.

(9) Set up guide-post trade studies to improve retailer attitudes toward canned foods.

(10) Start a nationwide net profit retail trade study.

(11) Establish a speakers' bureau and arrange for appearances at national and regional food industry meetings.

(12) Form key retail outlet sales training groups.

(13) Prepare and distribute trade information to N.C.A. members.

(14) Produce and distribute regularly scheduled newsletter to entire retail food field.

The foregoing is our considered opinion and analysis of the combined needs of the canned foods industry in the year ahead and the years to come. Canned foods must be associated with prestige and pride, but must retain their unique qualities of convenience, economy and time-saving in the mind of the consumer. Canned foods must retain their basic economic status with the retailer in the face of perhaps more glamorous, higher-profit items that compete for the space and the attention of management at broker, distributor and retailer levels.

Only with high-level planning and execution in consumer and trade relations can the canned foods industry hope to retain the hard-won gains it has made through the years from the industry's infancy and build for the future.

The Canner Views the Washington Scene

By H. Thomas Austern,
Chief Counsel,
National Canners Association

Washington these days offers more than a picture of monumental grandeur, and a view of the biggest and most expensive government on earth in operation. It has also a cacophony of vocal noises—of speeches, claims, orations, statements, and the public praise and polemic protest that help make politics in an election year.

Often I am reminded, in trying to evaluate what is going on, of the Indian in New Mexico who in July of 1945 went up into the mountains on a hunting and fishing trip. He had phenomenal success and bagged a deer, a bear, and many large trout. At dawn the next morning he thought he ought to tell his tribe down in the valley how well he had done. He started a brush fire and in the usual way made smoke signals with his blanket. Suddenly, off in the distance at a place called Alamogordo—where the first atomic bomb was being tested—he saw a blinding flash and an enormous surging cloud of smoke that quickly rose to a huge, fantastic mushroom high into the sky. Impassive yet impressed, the Indian observed to himself, "My, I wish I had said that!"

Once again it is my Convention assignment to epitomize and to report to this Board those Washington developments that are of cardinal interest to you both as citizens and as canners.

Yet many have asked me first to tell them how far during the past year success has been achieved in taking government out of business and getting more business efficiency into government.

The canners who ask that question must necessarily assume that the analogy between running the federal government and operating a private business enterprise is comprehensively valid, and that the comparison might be illuminating. Yet in judging President Eisenhower's efforts during his first year in an almost insuperable task, let us pause briefly to test that assumption.

Suppose you were asked to run so gigantic an enterprise—with 160 million customers, over $65 billion in expenses, and perhaps $60 billion in income—how would your authority, your problems, your objectives, and the methods available to you compare with those of the president of even our largest private corporation?

To begin with, you would have a board of directors—in this business called a Congress—of 531 men and women. They would be established in two bodies. In the senior group, the Senate, there would be an even division between those who wanted your management to continue and those who were publicly committed to throwing you out at the earliest opportunity. In the other your management would have only a slim majority of friends.

But this basic political and public division of confidence in your management would be only a beginning. Your vast board of directors would have the power, freely exercised, to tell you in minute detail what you might spend and collect. They would control your detailed costs down to the last dollar. They would dictate what you might charge for your product and services in the form of taxes. No matter what might be your own views on prudence and economy, the board—that is, the Congress—would and could regularly direct you to spend more than it would let you collect in income.

Yet that would not be the end of your troubles. The 531 people on your board of directors would be divided into innumerable committees each of which would constantly take up the time and absorb the energies of your department heads, your superintendents, and even your foremen. Your control over your own employees would be somewhat fuzzy. For each of them would and could constantly take his troubles and grievances directly to members of your board of directors. One member of your board, you would be distressed to discover, would spend his entire time harassing and frightening every man in your

organization in a constant attempt to prove a few to be incompetent, untrustworthy, or subversive. Indeed, this one man on your board would even invade your research laboratories to disrupt the vital and secret developmental work of the business and demoralize your scientific personnel.

In many other ways your job in running the business—if it were truly a commercial enterprise—would be strange. For even with your limited authority, you could not devote yourself to your real job. Instead, you would be principally worried about the physical security of your plants and indeed the lives of your workers and customers. For at any moment there would be the threat that some outside enterprise would bomb your factories, devastate the homes, and endanger the lives of your employees and customers.

Consequently, you would be devoting two-thirds of your expenditures, and possibly more of your time and energies, to this difficult job of defending the business and its customers from gangster aggression. You would be dealing with hordes of watchmen, security officers, radar fences, and the details of possible retaliatory action. Only the remainder of your time could be devoted to the business itself.

Even more peculiar would it be to find your stockholders organized in blocs—in farm groups, labor groups, veterans organizations, and many others who would insist that they could to a major degree interfere with your management, and have access—if not an open invitation—to discuss directly with your board of directors everything you do or might want to do.

Finally, no one would be wholly in agreement as to the objectives of the enterprise—what it should make or do, how and where it should operate, and how it should be run. All would accept the importance of security. But there agreement would stop. On everything else there would be vigorous majority and minority views which you would have to consider, often publicly answer, and everlastingly have to take into account.

Perhaps, after all, government is not exactly a business. Its real job may be as different as this obvious lack of similarity to a private enterprise would suggest.

To protect the lives and liberties and the property of its citizens—to promote their welfare—and to foster the complicated economy in which they live—to do all of these things better, yet cheaper and more efficiently—perhaps calls for skills vastly different and effort far more demanding than those found each day in the business world.

Viewed in this realistic light, President Eisenhower's determination first to learn the job, to restaff as fully and as quickly as the sticky rules permit, and initially to reorganize the Executive Branch of the federal government is understandable. There are a good number of new faces in government today. Many of the Cabinet and subcabinet positions have now been filled with experienced businessmen who will have abundant opportunity to learn the art of government. Still, of the 2,563,000 employees on the federal payroll in November, 1952, only some 196,000 have been let go. Administrative machinery does not change overnight, and it is still not too difficult to find considerable red tape in Washington.

The President has now, however, in a recent series of messages, mapped out a comprehensive legislative program. The big question during this

H. THOMAS AUSTERN

coming election year will be to what extent Congress will give him the means to carry it out.

One cannot in a brief talk—however panoramic his viewpoint—deal adequately with both the international scene and the domestic picture. Necessarily, they are interrelated, since the freedom of our domestic economy turns inescapably on the maintenance of that cold war we now call peace, and the strength of the free world is wholly dependent upon a vigorous and healthy American industry.

Yet a brief word is warranted about world affairs. The big news of 1953 was the truce in Korea. Whether this will develop into an over-all peace—or end abruptly in new hostilities—depends upon Russian and Chinese policy. Whether the aims of those two countries are or might remain the same I will leave to you. Some believe that the palace politics and the accompanying executions in Moscow will continue. Even the most optimistic anticipate continued uneasiness in our foreign affairs, but perhaps a year in which an attempt to talk will be paramount to any overt military action either in Korea or in Indo-China. The President has announced his firm intention to support those opposing communism in Asia, and he is solidly behind the effort for a Western defense community in Europe. Even though many Congressmen do not see eye to eye with him, it is not unlikely that the President's views on foreign policy will prevail in 1954.

Domestically, the pattern of federal government activity is measured by the budget—the subject of this morning's headlines. For in any activity—a business, a school, and of course a trade association—what might be done must always shrink to what one can afford to do. In government as elsewhere needs always exceed means.

By now most of you are familiar with the formidable proportions of that telephone-book-sized document called the Federal Budget. The effort and cost simply to prepare the budget was graphically, and almost unbelievably, illustrated by a recent report that it cost $30 million merely to prepare the Defense Department's portion of the budget. The story is that over 12 million man-hours, at an average cost of $2.50 an hour, were required to assemble the detail supporting the requested military appropriations. Even so, this preparation cost is but one-tenth of one percent of the requested military appropriation.

Over-all, the budget for fiscal 1955 beginning next July calls for expenditures by the federal government of $65,570,000,000, a reduction of over $5 billion from the amount to be spent during the present fiscal year.

Revenues are scheduled to be at $62.7 billion—if the President's tax recommendations are adopted. In short, there is a scheduled deficit of just under $3 billion. In other words, the Administration is not yet at a balanced budget; and many insist that we must look for even a larger deficit than these budget figures.

No matter how stalwart an effort is made to reduce government expenditures, the plain fact is that the areas which can be pruned still remain those in which reduction is controversial. The ordinary expenses of running the government will soon be cut to the bone. But since more than two-thirds of your tax dollar is spent for defense and foreign aid, it is only there that massive savings are possible.

For the next year the Defense Department expenditures are to be reduced from about $42 to $38 billion—a $4 billion cut. The President is willing to spend fewer dollars on defense, to have fewer men in uniform, and to place the principal defense emphasis upon air power and atomic weapons. His critics insist that one should not practice economy on the

nation's safety, but it is likely that Congress will respect his judgment.

Foreign aid remains a sensitive area of argument. Nevertheless, the Administration has still included in what it calls its national security needs over $4 billion for foreign military assistance.

The plain fact is that so long as the foreign situation remains critical, the fiscal pattern of the federal government will continue to revolve around the hard core of defense spending. By the same token any drastic change and increase in military demand will be directly reflected in federal spending. Only through the slow and presently remote evolution of real international peace can substantial reduction in the federal budget be anticipated.

Many of you have heard, and there will be much more talk, about the so-called "cash budget." The cash budget simply measures cash expenditures against cash received. But the cash receipts include not only current taxes but also social security insurance funds. The one percent total increase in social security taxes, made effective earlier this month, will alone bring in about $1,700,000,000 annually. Taken as a whole, social security taxes produce far more dollars than are currently required to meet the commitments of the program. The remaining receipts, aggregating about $2 billion annually, are automatically invested in government bonds. As a result, these annual cash additions to the insurance reserve are actually expended.

This is neither the time nor the place to debate fully either the economics or the politics of talking about this so-called cash budget. It may have significance in terms of inflationary or deflationary pressures—but it ought not to be confused with a real balanced budget.

As one editorial writer recently put it in apt fashion:

"If John Smith finds at the end of the year that he has spent more than his income, it is not advisable for him to attempt to meet the deficit by using trust funds of which he is the administrator. If he attempts it he is likely to go to jail.

"Neither does Mr. Smith solve his difficulty by drawing on the funds set aside to meet the payment on his mortgage. The chances are that the mortgagor will seek a foreclosure order.

"What constitutes unsound practice for Mr. Smith is equally unsound when it is adopted by a government . . ."

Any businessman who includes his annual depreciation as part of his net profits would not be highly regarded by his bank. But as I have previously suggested, perhaps government is not a business.

Of course the hope of a balanced budget turns on income. Government income is just another way of saying taxes. Or as one caustic fellow put it —after the government takes enough to balance the budget, the citizen has to budget the balance.

The tax picture for next year is extraordinarily muddled. The President has based his budget recommendations on his own tax program, but there is some question whether that program can be successfully piloted through Congress.

All of us know that personal income taxes were reduced 10 percent on New Year's Day. Likewise recently interred was the corporate excess profits tax—which is not likely to be resurrected short of real war.

For Congress, as well as for each of you, the main issue concerns the rates of corporate income tax and of the various excise taxes. Under present law, the corporation tax is scheduled on April 1 to revert to 47 percent from the present 52 percent level. On the same date various excise taxes are scheduled to drop sharply. In view of the substantial loss of revenue from tax reductions which became effective the first of the year, the Administration firmly insists that both the corporate tax and these excises should be continued at current rates. It has also asked that the first steps be taken to put corporation taxes on a pay-as-you-go basis.

It is highly unlikely that the present corporate tax rate can be held. Many feel that the best the President can expect on the corporation tax rate is a continuation of the 52 percent rate for the remainder of this year, with an automatic reduction next January to possibly 50 or 49 percent. An immediate compromise at about a 50 percent figure is not unlikely.

Excise taxes promise further difficulties for the Administration. Some of these are scheduled to drop sharply on April 1, and a number of Congressmen would like to see an across-the-board reduction in all excise taxes. Bnt here there can be no postponements and no schedule of future decreases. For if the buying public knows that the excise tax on any article is scheduled to be cut, everyone postpones buying that product until the tax reduction becomes effective. Even more difficult politically is the fact that each affected industry—whether it be telephones, railroads, perfume makers, or fur dealers—screams discrimination unless given equal treatment.

In another very important tax area, the Executive Branch and Congress have joined efforts to modernize the revenue laws. Soon after it took office, the new Administration began a detailed review of the revenue laws. This review resulted in the preparation—by Treasury and Congressional staff tax experts—of a monumental technical tax revision bill. It reflects a complete rewriting of the Internal Revenue Code, to make it more easily understood, that will eventually run to hundreds of pages. Many of the proposed revisions are of no direct significance to business. They concern combining the normal tax and surtaxes into a single schedule, liberalizing medical deductions, and allowing working mothers to deduct costs of child care.

Important for the canning industry, as well as for all business, is the proposal to shift to a "declining balance" basis for depreciating major business investments. Under this method of computing depreciation, two-thirds of original cost could be written off during the first half of the asset's life expectancy—as against one-half under the present "straight line" depreciation. Other proposed revisions, reflecting the Administration's desire to remove tax inequities, are initial steps toward eliminating double taxation of corporate dividends and the gradual elimination of penalties for consolidated returns.

The House Ways and Means Committee expects to complete this technical revision before dealing with anything else. If passed in the form prepared by the staff experts, this proposal will cost the Treasury an estimated $1.2 billion in revenue the first full year its provisions are operative.

More than a century ago a famous English Chancellor of the Exchequer in talking about taxes observed that one could not get blood out of a turnip. Inescapably, what the federal government can collect out of the economy depends upon its health and vigor. This obvious yet elusive fact cuts both ways. If business activity deteriorates, there will be an immediate demand for drastic reductions in the corporate tax rate and in excise taxes. Indeed, a serious recession would find many urging major reductions in individual income taxes in order to increase spending power. Almost with the convening of Congress there were rumbles among those championing these views.

But even the collection of the scheduled revenue assumes a reasonably sustained level of business activity. As always, January and the return of Congress brought an inevitable avalanche of predictions about business prospects for the coming year. Last month we entertained in Washington many conventions of economists and statisticians. Everybody had a field day in expressing his views on what business would be like in 1954. Nobody emulated the turtle and kept his neck in—and some made big smoke signals. Next week the Administration will make its own forecast in the Economic Report to be delivered to Congress.

History, it is often said, repeats itself—but most of these economic

prophets seem to repeat each other. To a large extent only the terminology changes. There is talk of "recession," of "technical adjustment," of "inventory stabilization," of "rolling readjustment," and other jargon. The most novel terminology was offered by Dr. Hauge, the personal economic advisor to the President, who suggested that our American industry is coming down from an "overtime economy."

Nevertheless, despite that jumble of words, there are some wide areas of agreement about the over-all economic prospect. Most of these experts agree that 1954 will be a year of moderate business recession. Phrased in their own terms, they look for almost a 5 percent fall in the "gross national product." In numbers that amounts to a reduction of over $15 billion from the present level of about $365 billion per annum.

Comparatively, that forecast is neither drastic nor dramatic. It would leave 1954 with the second highest income level in our history. Those who are disappointed perhaps resemble the fellow who for the very first time went the full 18 holes in 72, and then complained bitterly when he hit a mere 75 a week later.

But of both economic and political significance is the effect that even this over-all moderate decline might have on particular lines of business. The food industry is basically concerned with mass purchasing power. In 1954, we are told, unemployment will probably increase about 1.5 million. In all likelihood even though wage rates continue at present levels, there will be less overtime and thus less take-home pay. Industrial output will be somewhat reduced; wholesale prices will be a little lower; and despite the absence of an excess profits tax, there may be some decline in net profits in specific lines.

Yet many agree that this pattern will be uneven. For the food industry as a whole the experts suggest there will be little variation in processed food prices at either the wholesale or retail levels. Farm income may be reduced. During 1953 farm prices fell about 10 percent, although the tonnage marketed increased, and a downward trend may well continue for both farm prices and tonnage.

Any balanced report must include those few Cassandras who paint a far gloomier picture. The British economist, Colin Clark, feels that the United States stands on the brink of a real depression. Others say that the critical time will come in early spring when the Administration will have to decide whether it is dealing with a leveling-off situation or with the symptoms of a serious decline. Some are troubled by the absence of any important rapidly growing new industry to bolster weaknesses in other areas. They fear that any interruption in our sustained economic growth is in itself a serious symptom.

In the food industry, and certainly for canned foods, these prophets of doom forget one startling fact—the phenomenal growth of our population and the tremendous increase in the number of the very young. Between 1940 and 1954 the population of these United States increased from 132 million to 161 million. That increase approaches the entire population of France.

It used to be said that children were so expensive that only the poor could afford to have them. Yet last year alone 4 million babies were born. Five million copies of one book on baby care have been sold. In another 15 years it is estimated that our population will be 175 million. These postwar babies have changed the United States market picture as much as they have changed the lives of their parents. Incidentally, the relative scarcity of eligible bachelors may change since about 5 percent more boys are being born than girls.

Whatever else may occur, that vast growing population will continue to eat. Canned foods will still supply an important part of the American diet. Fewer automobiles, refrigerators, stoves, furniture, and possibly even fewer television sets, may be sold in 1954. But I confidently expect that an increased volume of canned foods will continue to roll in super market buggies and to fill the consumers' market baskets.

For as Carlos Campbell records in his annual Secretary's report, the per capita consumption of canned foods continues at high levels. You can safely assume that when this multitude of new babies grows up to eat their baked beans, they will say, "These are just like those in the cans mother used to open."

This is not to gainsay the explosive political potential in any serious business recession—particularly in an election year. In his State of the Union message the President emphatically pledged that he would have ready a complete program designed to maintain the strength of the economy in the event it is needed. Among the measures cataloged were flexible credit policies, tax measures to stimulate business, lending, grants-in-aid, and public works. These economic weapons are far from realities at the moment; and it remains to be seen whether they will be made available.

These requirements for preservation of a strong economy were only one of more than a score of subjects outlined for Congressional action in the President's State of the Union address. The Eisenhower program broadly outlined in that message has been aptly described as reflecting the "middle-of-the-road" philosophy that the President has espoused since his first speech as a candidate in Abilene.

Those who desire domestic as well as international peace have warmly embraced this middle-ground viewpoint. Nevertheless there have been some Washington wits, probably not wholly nonpartisan, who have remarked that the middle of the road is hardly a place to be recommended when the traffic gets heavy.

Yet in keeping with what the preamble to the Constitution calls insuring "domestic tranquility," the President's program avoids some the explosive measures, such as civil rights legislation, advanced by the previous Administration. On the other hand, he has proposed a far broader social program than might be favored by the more conservative elements of both parties.

Specifically included in these legislative recommendations, in addition to the tax measures, are new farm legislation, expanded social security and unemployment insurance coverage, revisions of the Taft-Hartley Act, and several housing measures. Congressional action on many of these will be sought during the current session.

Many would be surprised, however, if a great deal of basic legislation is passed by Congress this year. The legislators will be impatient to get home for the fall campaign. Many pending measures would be time-consuming. One thing is certain: the federal debt limit will have to be raised before Congress goes home. Yet in an election year, talk rather than commitment often seems most desirable.

On the farm program, however, lines will undoubtedly have to be drawn. It is impossible to tell how the Administration's agricultural proposals will fare at the hands of Congress. The over-all plan was offered last week in a special message to Congress. Essentially, it calls for flexible rather than rigid price supports on basic commodities—a system under which support prices, ranging from 75 to 90 percent of parity after the 1954 crop, would rise when the government wished to encourage production and fall in times of oversupply. Support prices and loan values would be lowered as production increases. The surpluses that are now bulging federal storage bins would be earmarked for special purposes, such as the school lunch program or disaster relief.

Viewed broadly, the Administration farm program can be described as a studied attempt to get away from the rigid high price supports that are presently in effect, and which have built these vast government-held surpluses. They are expected to pass the $6 billion mark by this coming June and to exceed $8 billion by the end of 1954. They must be gotten out of the way before the new program can operate. Parity values would be modernized, but market

prices are to play at least a part in regulating production.

Yet many doubt whether, as a political matter, enough votes can be mustered to eliminate the straight 90 percent supports. Even the staunchest supporters of the Administration's proposals candidly admit that a difficult struggle lies ahead. For the statutory price support structure for American agriculture can be changed only slowly. Everyone seems agreed that something should be done, but no farm program will be readily accepted by all.

What President Eisenhower is up against is perhaps illustrated by the story of the school teacher who was questioning one of her farm boy students. She asked, "Johnny, if a farmer has 5,000 bushels of corn, and corn is worth 40 cents a bushel, what will the farmer get?" "A government loan!" the up-to-date farm boy promptly replied.

In his farm message the President also made a passing and somewhat elliptical reference to "marketing agreements for fruits and vegetables." He recommended that their use be continued and liberalized to "provide for inclusion of additional commodities for which marketing agreements are adapted." A close reading of these recommendations makes it clear that they refer to marketing agreements and not to compulsory marketing orders imposed in the absence of agreement. The suggestion that they be extended to those commodities to which marketing agreements are "adapted" indicates at the very least a recognition of the controlling distinction between the handing of a perishable raw commodity, and the packing and marketing of a canned product, in which the processor has the major investment and which unlike the raw commodity is marketed throughout the year.

Absent some basic and fundamental changes in the law that would accord appropriate recognition to these economic realities, there is no reason to expect that the President meant to include canning crops under compulsory marketing orders. For under those orders, as to which the canners would have no vote, there can be controlled the quantities and grades of what they may pack, from whom they may buy, where they might sell, and permit private assessments over which they have no control. It can hardly be expected that this proposal, rejected ten times by successive Congresses over the past two decades, will be enacted during the present session.

Confirming that belief is the statement of the U. S. Department of Agriculture the very next day that the Administration planned to "continue virtually unchanged" the programs for a variety of commodities including specifically "fruits and vegetables".

On the labor front President Eisenhower has, many think courageously, asked Congress to reopen and amend the Taft-Hartley Act. Here again the middle-of-the-road path is being pursued. In the words of his labor message, "no drastic legislative innovations" are considered desirable or required. Some of the 1953 proposals, whose rejection led to Secretary Durkin's resignation, have not been followed. The changes suggested are undoubtedly balanced since most commentators have observed that they appear to be evenly divided between those which might be called prolabor and those that might be termed proemployer.

Of the 14 specific labor proposals, two are possibly of direct interest to the canning industry. The requiremen that union leaders must file anticommunist affidavits is to be extended to require employers to do likewise. Where an economic strike is called by a union, it is proposed that the National Labor Relations Board immediately hold an election among the workers affected as to whether the strike should be continued. Since that type of vote would acutely pose the issue of confidence in the labor union, some believe that it might do more harm than good. For past experience with elections as to whether a union be permitted to ask for a union shop would tend to confirm this view. On Taft-Hartley, certainty in forecast must be limited to saying only that this will be an extremely controversial subject in the present Congress, that many additional proposals will be offered, and that few will survive the likely heated debates.

Perhaps most striking in the recent Washington scene have been the many commissions appointed to study and report on particular subjects. The President's farm program reflects to a high degree the recommendations of the National Agricultural Advisory Commission. The Randall Commission appointed by the President to consider policies on foreign trade is complemented by Senator Capehart's large advisory committee on foreign investment expansion. Another commission has recommended increases in the pay of Senators, Congressmen and federal judges. In the antitrust field the Attorney General, at the direction of the President, has appointed a large advisory committee to study the administration of all of the antitrust laws, including the Robinson-Patman Act.

Not unnaturally there are some who scoff at this advisory committee technique. Others suggest that no problems were ever solved by appointing committees. Nevertheless, many people believe that these commissions and committees can and will perform a valuable function—if only in assembling necessary information. For many a man thinks he has an open mind when it is merely vacant—and when the facts are in it is often possible to formulate dispassionate and bipartisan recommendations. Many of you have served on government advisory committees, and I am confident that no one is prepared wholly to write off their efforts in advance.

As one views the remaining vast administrative front in Washington only a few summary comments seem warranted. All of the agencies are operating on considerably restricted budgets. Nevertheless, each of them continues to be active. Many new antitrust proceedings have been brought and a great many more are now under investigation by the Department of Justice. The Federal Trade Commission in a recent complaint ventured into the difficult area of labor relations, and is complaining that agreements between salmon canners and fishermen's unions violated the Sherman Act. Still pending before the Trade Commission is the 1951 complaint charging that a group of tomato canners conspired to boycott a farm cooperative. Actively under investigation are also a good number of recent mergers and acquisitions of competing companies, some in the food field. Recently, the Trade Commission made it clear that in reviewing these merger cases it will make a business-like inquiry into the actual economic effect of any questioned transactions.

Fundamentally, one can say that there is in Washington now a new, revitalized, and far more realistic Federal Trade Commission. It has already evidenced a truely expert understanding of the facts of life in American business, an intelligent awareness of the real objectives of the laws it enforces, and an abiding appreciation that its job is not to harass buyers and sellers but to foster and to protect real competition.

The Washington scene in 1954—you might agree—is as interesting as it is uncertain. Any prophecy, no matter how eloquently vague, would be hazardous. The cardinal question is whether Congress will give President Eisenhower substantially all or only an awkward few of the measures he has asked.

No one envies the President's task. He must resist the extremists, both liberal and conservative. He must bridge every type of division—political, philosophical, sectional, and economic. Party lines in so divided a Congress will hardly prove controlling. Over-all there looms like a brooding omnipresence in the sky the complexities and largely uncontrollable uncertainties of foreign affairs.

Perhaps by the end of the year many—with a renewed faith in the democratic processes—will recall what Edmund Burke said almost two centuries ago:

> "All government—indeed, every human benefit and enjoyment, every virtue and every prudent act—is founded on compromise. . . ."

N.C.A. ANNUAL MEETING

Greetings to the Convention Delegates

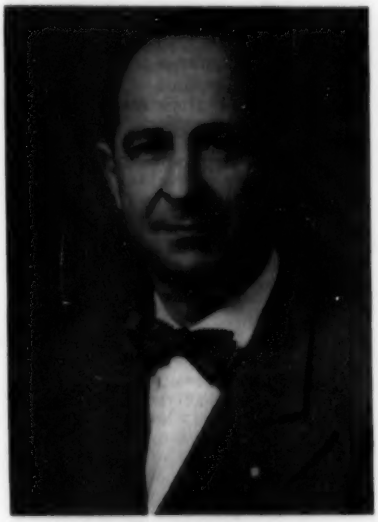
By Louis Ratzesberger, Jr.,
1953 President,
National Canners Association

It has often been said that to make time pass quickly you need only sign a 30-day promissory note. During this past year I learned that an equally effective way is to be President of N.C.A. I can only hope that the expiration of my term will bring more pleasant circumstances than the expiration date of a note.

At any rate a year has passed since Fred Heinz handed me the gavel and it is now my privilege to welcome you to the 47th Annual Convention of the National Canners Association. This gathering of canners and the allied industries is rated as the largest assembly of business men held in America. We can well be proud of this fact and at the same time make this accomplishment a step to greater achievements.

Each year we feel that the very best convention program is planned for your information and inspiration. Again this year you will find sessions geared to all phases of your business—from field problems, through the canning operations, and into the subject of marketing. Seldom in the last ten years have we been able to consider our industry problems separately from those involving federal emergency regulations. In fact, some conventions have been devoted almost exclusively to problems created by war or emergency situations. I hope every canner will take full advantage of the interesting and authoritative presentations that will be made in the next few days.

May I express my sincere thanks to you for the opportunity to serve as President of your Association this past year. Of all courses of instruction I have ever taken, the past year's has been the most enjoyable, as well as the most strenuous and rewarding. My appreciation for the work of our Association, and the loyalty and effectiveness of all the staff multiplied from day to day. Having had the fascinating experience of visiting many canners individually in their plants, attending many state and regional association meetings, and watching at close range our national association function, I thought frequently of one of the passages in Boswell's "Life of Johnson." Boswell told his friend he had been at a meeting of Quakers where he had heard a woman preach. Johnson remarked, "Sir a woman's preaching is like a dog's walking on his hind legs.



LOUIS RATZESBERGER, Jr.
1953 President

It is not done well; but you are surprised to find it done at all."

I don't mean to infer that our industry doesn't function well, because it does. But with the diversity of products, problems, and interests, it is amazing to find so much unanimity at the national level. The progress we have made in 46 years would not have been possible without a strong national association, and further progress is bound to come with continuing support from all sections of the country and segments of the industry. This support must be both financial and personal dedication. While we depend largely on our full-time staff for much of the Association activity, the personal effort that you as an individual devote to committee work and otherwise in behalf of the Association determines finally how much value there is in N.C.A. for the industry.

If you feel as I do that N.C.A. dues are a good investment, consider yourselves as No. 1 salesmen for N.C.A. and do this job with your growers, employees, suppliers, and consumers, as aggressively as you do with your own products. Speak a good word about our Association to other canners, particularly to those who are not now members.

Recently I heard a panel of three experts on the subject of business views for 1954. The third speaker started by relating the incident of a teacher posing a problem in arithmetic to one of her students. She asked, "If it took one man two days to plow a certain field, how long would it take two men working twice as fast?" The student replied that since the field was already plowed, he didn't see any need of plowing it again.

Since there is going to be a lot of plowing done here by distinguished and qualified persons, I will pull my equipment out of the field and let the experts go to work.

Presentation of Gift to President Ratzesberger

By Fred C. Heinz

I consider it an honor to have been selected as the person to say a few words in appreciation of the services of our outgoing President, and to make the presentation of a gift to him in behalf of our membership as a token of our feelings of affection and admiration for him and for the excellent service he has rendered to the national canning industry during the past year.

On taking office as President of the Association last year, Lou Ratzesberger said:

"Although I made no campaign and hence, no campaign promises, I will make a post election promise—to do my utmost to promote the well-being of our Association and the canning industry."

This he has done and done well. He did it during the year his company, the Illinois Canning Company of Hoopeston, Illinois, was celebrating its 75th anniversary. We are grateful to you, Lou, and to your Company for furnishing us such able leadership during 1953. To the Illinois Canning Company, may we extend our sincere thanks and good wishes for its continued success.

The staff desires me to express to you their appreciation of your helpfulness to them and consideration for them.

None of us has forgotten the momentous occasion of the birth of your triplet grandchildren. The gift we have for you we hope will be used to recall the many occasions you couldn't be with them, because of Association business. We trust this motion picture projector will record such occasions and remind you and your charming wife of our kindly sentiment for you.

Nutrition and Your Health

By Fredrick J. Stare,
Harvard School of Public Health,
Harvard University

It should be obvious that I am pleased to appear on the program of one of the national meetings of the Association in which my father was long active and of which he was President for a period during the last world war. Thank you for inviting me.

In thinking of what I might talk about this morning, I have taken the liberty of changing the subject somewhat—from "Food and Your Health" to that of "Nutrition and Your Health" because I feel I know a little something about nutrition but not too much about foods, and there is a great difference. While nutrition is certainly concerned with food, it really deals with a study of the ingredients of food known as nutrients and their relation to health and disease.

Within the past generation, the science of nutrition has made sound and stable advances—greater progress than in all the preceding centuries.

Discovery of the vitamins and their manifold relation to the health of the body came from biochemists working on problems of nutrition.

The action of nutrients in the blood stream and on the body tissues has been explored and much information gained bearing on human health.

New knowledge has been acquired relative to the requirements of man for many of the nutrients—vitamins and amino acids.

Diseases such as diabetes and liver injury have been controlled and prevented through utilization of nutrition. High blood pressure and hardening of the arteries, the greatest killers of present-day Americans, are diseases in which nutrition is somehow intimately concerned.

Guarding the life of the mother and child, nutrition has played an important part in prenatal care. It has been utilized in preoperative and postsurgical care. It has been recognized as the prime factor in developing the health of children and in maintaining the health of the aged.

Yet, much remains to be done in nutrition, in research for new knowledge, in teaching leaders who can carry forth the present knowledge of this science, and in service through communities, hospitals, and industries.

Nutrition can be thought of in terms of chemical units—the nutrients provided by food, such as protein, inorganic salts, and various vitamins, or in terms of food. However, various diseases such as scurvy and rickets were found to be cured and prevented by eating certain foods. More recently, certain types of anemias, liver disease, certain types of high blood pressure and heart disease have been found to have important interrelations with diet. In these cases, and in many others, chemists were successful in separating the food into chemical units which were effective in preventing a specific condition; a particular food was then of special value because it contained certain vitamins, minerals or other nutrients. In many cases the identity of these essential nutrients has been determined. Foods have been assayed for their content of specific nutrients, the effect of processing and preserving on nutrient content has been studied, and foods can be given some specific evaluation in terms of their particular contribution to nutrition.

Your own Association has made a distinct contribution to nutrition through the studies that have been done in your own laboratories as well as those financed in part by funds you have provided to various universities —studies dealing primarily with the effect of the commercial canning process on the nutrient content of foods. We probably know more about the nutritive values of canned foods than any other type of foods, thanks to your Association. And I might add that the techniques of commercial canning have been so improved in the last two decades that the nutritive value of many canned foods is actually superior to that of many fresh foods as ordinarily available to the consumer.

The desirability and the need for technological basic and applied research in the food industry seems to be admitted and is evidenced not only by the government and academic research programs, but in the many industrial laboratories in this country where we find closest contact with the industry problems. These laboratories have recognized responsibilities to the special industries which they serve. Your N.C.A. Laboratories, for example, have served the canning industry since 1913 and their continued existence testifies to the fact that they have lived up to their responsibilities in handling scientific problems of the industry.

This may all be very true, but what has it got to do with your health and mine? Most of you in this audience probably have the old-fashioned view, which I am sorry to say many of our health officials still have, that the provision of ample amounts of clean, wholesome food means good nutrition —particularly if the type of food provided is the type you are selling. That is important but it is not nutrition.

As I have already stated, nutrition is the science of food and its relation to health, the effect of the ingredients of food (nutrients)—their absence, presence, or excess—on health. I doubt that many of you really believe that your health, and the health of your family and friends, could have been improved, and can be improved by better nutrition. We all take time for lunch and dinner. Some of us eat a good breakfast. In all likelihood none of us has ever had to go without enough to eat. Hence, we might logically question if lack of good nutrition has impaired our health. Yet it may have.

Here are a number of specific ways in which the application of modern nutritional knowledge can improve the health of people like you and me.

(1) Prevention and treatment of overweight and obesity. It is estimated that there are 25 to 30 million overweight people in the United States. It is well known that individuals who do not become obese live longer and are healthier than those who do. The Metropolitan Life Insurance Company has found that fat people who lose weight will live longer than they would have lived had they remained fat. Some new ideas on the causes of obesity have come from our laboratory in the past year. These new ideas deal with the fundamental physiologic reasons for overeating, and they offer new possibilities for more successful treatment. Overweight is a real hazard to health; something can and should be done about it. Those of you in a business that depends on selling food may not like the idea of advising a substantial segment of the American public to eat less, but a little simple arithmetic with insurance statistics will readily show that by eating less one will actually live longer to eat more.

(2) Treatment of high blood pressure. It is known that 25 to 50 percent of the cases of high blood pressure can be satisfactorily treated by dietary means. Low-sodium diets and reducing diets are sometimes indicated.

(3 and 4) Treatment of atherosclerosis and heart disease. The avoidance of overweight or weight reduction, a generous protein intake and a low fat diet are cardinal points in the treatment of atherosclerosis and heart disease. They may prove to be preventive measures.

(5) Prevention of nutritional anemia and (6) prevention of tooth decay. These common ills can be prevented in large part by providing, at the proper time, adequate amounts of two minerals; in the case of anemia, iron, and for dental caries, fluorine. A well-balanced diet in general is also necessary.

(7) A healthier infancy and (8) a healthier childhood. Better nutrition offers improved growth and development in the prenatal period, as well as in infancy, the preschool, and adolescent years.

(9) A healthier adulthood and (10) a healthier old age. Improved nutrition will aid in the protection of body functions at high levels of health and help maintain a maximum of physical

and mental efficiency for a maximum period. This is of special interest today when we realize that more people are living into the 70's and 80's than ever before. Good nutrition may spell the difference between years of doting senility and years of worthwhile living for you and me.

Facts to support these statements concerning 10 specific areas in which nutrition today may improve your health come largely from the research laboratories of universities, medical schools, hospitals and of our National Institutes of Health in Bethesda, Maryland—a part of the United States Public Health Service.

I wish there were time to tell you of some of the research contributions supporting the above statements that our own laboratory has made and the researches we are working on now. To us they are exciting, and I think they would be to you also.

It might interest you to know that our new theory for explaining and treating obesity came largely from studies of a new strain of obese mice which we have worked with for the past three or four years. Some of our ideas on nutrition and the heart result from experiments with ducks. The organ grinder's monkey has turned out to be what we think is the most important experimental tool to provide the essential facts in the causation of the common type of hardening of the arteries as it relates to nutrition. This is the type involved in coronary heart disease. Comparative blood and dietary studies between Guatemalan Indians and American executives are providing data which we hope will contribute to earlier diagnosis, and possible preventive measures, for coronary heart disease.

Research is but part of our activity in the Department of Nutrition at the Harvard School of Public Health. Realizing that the results of research are of value only when they are made known and applied in daily living, we carry on an active program of nutrition education.

All professional workers in health should acquire an understanding of the importance of nutrition in health and a working knowledge of the principles of good nutrition. To enable them to do this we maintain an active teaching program for medical students, public health school students, and physicians, young and old, who are on the staff of various hospitals in Boston. During the past two years our department has cooperated with the Metropolitan Life Insurance Company, the United States Public Health Service, and the American Medical Association in presenting nutrition exhibits and a continuous series of nutrition lectures at the national meeting of the American Medical Association.

At the present time, with the help of funds from The Nutrition Foundation, we are preparing a manual of nutrition for the American Public Health Association—a manual designed for public health officers and their staffs to show them where and how nutrition can fit into public health activities. Also may I mention *Nutrition Reviews*, published monthly by The Nutrition Foundation to help professionally-trained people keep abreast of current progress in the science of nutrition, for it is edited in our department.

There are other areas of education in nutrition besides the professions. These include the school child and the general public.

Every school child should be provided with sound nutrition information as a part of his basic schooling. Nutrition can be taught, and taught well

Dr. FREDRICK J. STARE

as a part of "reading, writing, and arithmetic." We know this to be a fact because we have done it in a small way in our studies in the public schools of Newton, Massachusetts; Rutherford County, Tennessee; and Ascension Parish, Louisiana. "Let's Teach Better Nutrition" is a 30-minute colored film describing these studies. Those of you interested in your local schools, and I hope you all are, ought to borrow a copy and have it shown before local teacher, parent, and civic groups.

The general public should be made aware of the importance of sound food and nutrition practices to health and to the national economy as well as to the individual. We must provide the "know-how" to feed families in the home, groups in institutions and restaurants—economically and well.

Four ways in which we have helped in this area of nutrition education are:

(1) For several years we have written sections on nutrition for the *Encyclopedia Britannica* and two other nationally circulated encyclopedias.

(2) A year and one-half ago a report on nutrition for the nonpartisan President's Commission on the Health Needs of the Nation was prepared in our department.

(3) The American Heart Association booklet entitled "Food For Your Heart" was prepared by our department and is distributed through state and local chapters of the American Heart Association. It attempts to tell in understandable terms the importance of good nutrition for the case of your heart.

(4) We have prepared for The Nutrition Foundation a pamphlet entitled "A Balanced Diet." These publications provide sound nutrition information for the general public.

Who pays for these researches in medicine and public health, these educational activities for both the professions and the public? The universities from their dwindling incomes from endowment, private foundations which with few exceptions are becoming smaller, industry to a small extent, but fortunately our federal government through its Department of Health, Education, and Welfare, its Department of Defense and Department of Agriculture, and its Atomic Energy Commission has been able to support many of these activities.

To me it has always seemed shortsighted that industry as a whole was not a very generous supporter of the types of researches I have mentioned to you. For example, in our Department of Nutrition at Harvard, less than 20 percent of our research funds are obtained from the food industry and we are probably the most generously supported department of this type in the country. And may I say thanks to those who do support us; they know we appreciate their generous unrestricted support. But it is usually hard to interest a specific industry or company in support of researches in hardening of the arteries, high blood pressure, or obesity if they cannot visualize some short-term advantage in regard to sales—this despite the fact that a majority of their directors and officers will die unnecessarily soon because of a lack of knowledge of these problems.

The food industry has been forward in its formation of The Nutrition Foundation which does support basic researches and educational activities. But the support it provides the Foundation is trivial compared with advertising costs. It should be increased 20 to 30 times. I am sorry that so few members of your Association are also members of The Nutrition Foundation. You all should be members.

Food, which is our major source of nutrition, has such a profound importance to our health—not only the health of people in some far away land

that is struck by famine, pestilence, or war—but to the health of you ladies and gentlemen right here in this room, and your families and friends back home, that it would appear that the food industry has a major public responsibility and should be eager to support generously, basic researches and education activities related to nutrition.

Nutrition is of importance in health —of tremendous importance—of importance to your health right today. Continuing research will discover new facts to show more ways that this is true. Continuing educational efforts will get this newer information to the doctor, the teacher, and the public so it may be applied.

In the present stage of medical and health development in the United States, with diseases due to poor sanitation and infectious agents, which, a generation ago were among the leading causes of death, increasingly well controlled, nutrition is the most important environmental factor affecting the health of the American people. Nutrition is the environmental factor most importantly involved in the development of the type of hardening of the arteries which in its various manifestations will kill more than 62 percent of the people in this room, and of a larger percentage of the men.

Yes, nutrition has had and will have much to do with your health.

Address

By The Honorable Oveta Culp Hobby, Secretary of Health, Education, and Welfare

Your invitation to address this forum of a great American industry is very much appreciated, and I am very happy to be with you today.

For it gives me an opportunity, among other things, to remind you of some of the many interests your industry has in common with the Department of Health, Education, and Welfare; and second, to place before you some of the problems which we share.

For the fact that interests are shared means, of course, that the responsibility for their solution is a shared obligation.

It seems to me that this concept is a fundamental one in our system of free enterprise. It presupposes an active and continuing partnership between the federal government and our states and local communities, between groups such as yours which are representative of business, between labor, voluntary associations, and all the many and variable organizations which exist within our society.

It rests upon the obvious fact that a democracy can succeed only to the degree that its members accept the obligations of citizenship.

I do not mean to suggest that the problems of government in a democracy can be simplified to this simple proposition. The processes of industry have grown far beyond the imagination of the generations of the 19th century. So have the concepts, the responsibilities, and activities of government on all levels.

If democracy is to succeed—and who will doubt that it shall—we must all continue to work at the job. By focusing our attention on one aspect of that task, we can, perhaps, arrive at a clearer concept of our respective obligations.

Because ours is a highly complex society, this obligation—this partnership—expresses itself in specialized areas of interest.

Your industry and our Department provide many examples. The technical problems of the Food and Drug Administration, about which I wish to speak in further detail in a moment, is the most obvious illustration. There are, however, others.

The Department, in the programs of both the Food and Drug Administration and the Public Health Service, is concerned, as you are and as state and local health departments are, with food sanitation, with chemical additives to food products, with pesticides, and many other associated problems.

What, specifically, are some of these problems of shared interest and shared responsibility?

As an industry which requires large quantities of pure water, you share with us a concern for the mounting problem of water pollution in America.

I am informed that as long ago as 1927, your Association began, on its own initiative, to provide financial and technical support of research into the means by which the enormous waste of our water supplies could be checked. Your Western Branch Laboratory, I am told, has shown that it is possible to cut in half the amount of water requirements of a canning plant. The Florida citrus canning industry, in achieving success in feeding citrus canning wastes to cattle, has also contributed significantly to the control of pollution and the conservation of our national water supply.

Such projects as these, carried on independently or in cooperation with government, exemplify the kind of effort that is characteristic of American enterprise and represents the kind of assumption of social responsibility which I mentioned a moment ago. The pattern can be repeated in many other industries.

Yet it would be a mistake to assume that what has been accomplished up until now is sufficient. For it is the consensus of National Technical Task Committee on Industrial Wastes, representing some 30 industries, and of the Department's technicians that safeguarding our water supply will require intensified effort, particularly from industry.

The requirements of our growing population—with 33 million added since 1940—and the doubling of our industrial output in the same period have severely taxed our water resources.

This tremendous expansion of our economy has brought with it, of course, its own problems. The rapid progress of the chemical industry has brought many thousands of new products into wide use.

The development of pesticides and of chemical additives to foods has had and will continue to have important effects on your industry. They also impose upon our Department new obligations.

You already know of the endorsement we have given to legislation which would make certain that new pesticides are properly tested before they are used on food crops.

With respect to chemical additives to foods, we share a common concern: to see that harmful substances are kept out of foods.

The records of the Food and Drug Administration indicate that some of the chemical additives that have been proposed for foods have been unsafe —even in small amounts. I am glad to say that none has involved canned foods.

I have touched on these two topics—one germane to industry as a whole and the other more specifically the concern of your own branch of industry—not in an attempt to suggest that either industry or government have pat and specific answers.

Indeed it is a characteristic of a progressive society that the solutions of our problems—whether they concern broad social questions or technical matters—are scarcely ever pat and seldom final. My aim has been, rather, to illustrate the principle of shared responsibility and shared obligations which plays so important a part in our economy.

I know that you are deeply interested as well, however, in developments in the Food and Drug Administration. I shall not attempt to discuss with you any of the technical developments. There are a few points of general interest which I want to mention.

First, I want to thank all of you for the many messages we received from the canning industry last year when the nation was, for a short time, without a factory inspection law. Hundreds of you hastened to assure

our Department that you did not object to the inspections of the Food and Drug Administration. As you know, the sorely-needed statute was restored last spring by the Congress.

The support of measures for the improvement of the quality of food products by your Association is not, of course, a new thing. You were active in your support of the McNary-Mapes amendment to the original pure food law in 1930; and I am sure that we can agree that the passage of the bill started a new era for all of us—consumers, manufacturers, and government.

It is no news to you, but I should like to take note of the fact that, under its provisions, standards have been agreed upon and established for more than 200 foods in 17 different categories, including 40 different canned vegetables.

We are aware, of course, that the procedures followed by the Food and Drug Administration in setting its food standards have not always met with the full approval of all parties concerned. We have been criticized, for instance, because of unavoidable delay in drafting and issuing some standards.

In part, this delay has been a result of a policy of giving first priority to matters that affect health.

To take one example, the Food and Drug Administration recently held hearings to develop more satisfactory labeling of special dietary foods prescribed for persons on low salt diets. This action was highly important for the many who suffer from heart disease. Improving the labels of their special dietary foods is, therefore, our first order of business in this field.

Our standard-making procedure itself has also been criticized as being slow and cumbersome.

As they are now conducted, food standards hearings do, in fact, sometimes result in substantial expense to individual firms, as well as costly delay in getting the answers to complex technical questions. It may take hundreds — or even thousands — of pages to record the required scientific data and legal opinion.

For our mutual benefit, we are now trying to reduce both the costs and the delays in these hearings.

Our Department of Health, Education, and Welfare, for example, is heartily in favor of the so-called Hale bill to shorten the standard setting procedures.

Under this bill, when hearings would open, there would already be an agreed position on the scientific facts. The hearings would then proceed to the controversial issues, with respect to which you would, of course, have a full and fair hearing.

The Hale bill has been backed by many prominent members of the bar including your own distinguished Chief Counsel, Mr. Austern. We sincerely hope that Congress will complete enactment of the bill in this session.

These are two general areas in which we are moving forward, with, I am glad to say, the help of both your industry and others. Our aim—and it is shared by the majority of industry in the fields of food, drugs, and cosmetics—is to insure that the consumer gets products which are pure, wholesome, and both informatively and honestly labeled. It is in our mutual interest to do all that is in our power to see that the minority of laggards conform to proper standards.

As you well know, not everyone is fully aware of the law behind the labels on your products. Very few

OVETA CULP HOBBY

Americans realize the extent to which the Food and Drug Act protects their health and their pocketbooks. They have not always heard, either, of the great part played by your industry in the continuous improvement of that far-sighted statute.

Many of you here today will remember, for example, the period in the 1920's when substandard products were flooding the market. The government could not prevent the sale of these substandard products without a generally accepted definition of a standard food product.

And how could the consumer buy wisely? In those days the housewife could not depend upon the label to warn her against substandard foods.

How markedly the picture has changed since those days can be illustrated by a single example.

We of the Department of Health, Education, and Welfare have watched, with great interest, the efforts of the food industry to inform the consumer about the varied uses and nutritional values of canned foods.

In nutrition as in medicine, quackery thrives on ignorance. It is dispelled only by education. The work being carried on by your scientists and home economists marks, in my opinion, a genuine contribution to the health and well-being of the American people.

Nutrition education can do much toward the solution of one of our principal public health problems of today —the chronic diseases and the heavy burden they lay especially upon our increasing number of "senior citizens."

So far, I have spoken mostly of problems. Let me just say a word or two now about frontiers. For there are, despite the counsels of pessimism, frontiers in American life—in business, in education, in government. And they will continue to exist as long as there are problems to challenge the American imagination and American resourcefulness.

When we look to the future of America, how can anyone be pessimistic?

In America in 1948, for example, our production of goods and services was over $246 billion. It has been estimated that by 1960—six years from now—we will be producing $416 billion annually. And this is a moderate figure.

When we think of the future in terms of certain of our important national needs—of, let us say, a production potential—the prospect is bright.

It has been estimated that:

We need some $40 billion for schools and hospitals.

We need some $60 billion for highways.

We need some $100 billion worth of housing.

Our needs are immense, and our potential is vast.

To realize it we must have faith in the future.

And now, may I say just a word or two about the present Administration. For its philosophy—its ideas, motives, and objectives—are of importance to you both as businessmen and women and as citizens.

President Eisenhower has repeatedly spoken of his belief in the philosophy of middle-of-the-road liberalism on economic and social issues. He has said that he believes it is a philosophy to which most Americans can wholeheartedly subscribe.

In a broad sense this philosophy of middle-of-the-road liberalism will safeguard the welfare of the American people in terms of the needs of the mid-Twentieth Century and still provide the necessary safeguards to protect those traditional principles of freedom which have made America a great nation.

As applied to the programs of our Department, the President expressed

his philosophy in his first State of the Union message when he said:

"This Administration is profoundly aware of two great needs born of our living in a complex, industrial economy. First, the individual citizen must have safeguards against personal disaster inflicted by forces beyond his control. Second, the welfare of the people demands efficient and economical performance by the government of certain indispensable social services."

I consider that statement the basic charter of our Department.

Within that framework there is ample room for the kind of partnership toward progress I have spoken of today.

Again, let me thank you for the opportunity to meet with you. I look forward to our continuing cooperative association in the years ahead in the great tasks that lie before us all.

To make this partnership work—to move toward the bright prospect of a better America—is our challenge.

I have every faith that our close continuing cooperation will help in achieving that great goal.

What the American Housewife Thinks of Canned Foods

By Raymond A. Robinson,
Director of Research,
Crowell-Collier Publishing Co.

My part in your program is largely that of reporter. I've been asked to report to you what the American housewife thinks and does about canned foods.

To get this information we've talked to quite a few hundreds of your customers—nearly 2,500, in fact. If you took the time to interview these customers yourself, we figure you could probably talk to 50 a week or all 2,500 in 50 weeks, leaving two weeks' vacation at the end of the year which you would certainly need.

But thanks to modern research sampling, we can save you this year and it is a pleasure to bring you the results in capsule form, which we estimate will take about half an hour to digest.

These interviews were selected in such a way as to give us, we believe, a cross section of the urban housewives of America.

I want to tell you briefly how we did the study so that you can understand the findings.

How the Survey Was Made

Our survey is based upon personal interviews with these homemakers, and the field work was done by our own staff of investigators. The breakdown of interviews is in proportion to the population of the country by Census areas and to the distribution of population by size of town. The sample also is controlled by income so that we have in our sample group, we believe, the urban United States in miniature. A total of 68 communities were included to produce this national sample—ranging in size from the largest cities such as New York, Chicago, Los Angeles, Philadelphia, and others, down to small towns of 2,500 populations.

The interviewing was done during the last week in October, which is important to bear in mind since, of course, it affects the results. The U. S. Department of Agriculture figures show that canned foods sales are not as high in the fall as in the winter or spring, so our figures are a conservative statement of buying which is all right for this survey because we don't present it as a report on total consumption. Also you will notice that some individual products will be seasonally high and others correspondingly low.

We first asked the housewife what vegetables she had served yesterday, including all meals and between meals, whether these were fresh, canned, frozen or dried, and the same for fruits and fruit juices. Putting this on the basis of yesterday reduces the memory factor to the minimum and gives more accurate results, as many studies have proven. Then we asked about the day-before-yesterday and found the results so closely comparable that it was possible to include this day also and thereby practically double the sample. We did this each of the seven days of the week of October 26 so we are able to bring you a picture of the average day's consumption of fruits, vegetables, and juices by a cross section of American urban families.

Average Daily Home Consumption

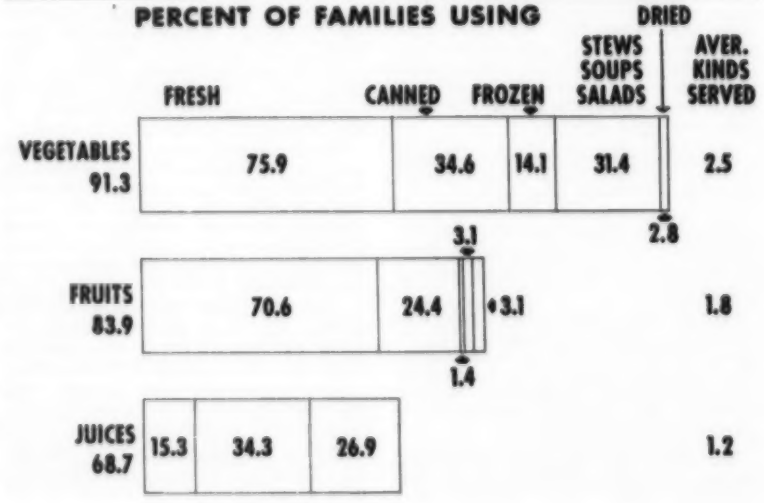
Here we see the dramatic role of vegetables, fruits, and juices in the diet of the American family on an average day. It was felt that for the purposes of this survey it would be better to show not only canned foods, but fresh, and frozen and dried products as well, so that the relationship in the diet might be seen.

Practically all families (91.3 percent) used some kind of vegetables on the average day if they cooked at all. About three out of four (75.9 percent) used fresh vegetables, such as potatoes, tomatoes, carrots, and lettuce, while more than a third (34.6 percent) used canned vegetables. This is tantamount to saying that every day one-third of America's housewives serve one or more varieties of canned vegetables.

Users of frozen vegetables totaled 14.1 percent of all families in an average day, which is roughly one out of seven families.

Of course a great many families also serve vegetables in the form of soups, or stews, or salads. It would have been very difficult to identify all the different kinds of vegetables that were used this way. Often they just accumulate as leftovers. But at least

AVERAGE DAILY HOME CONSUMPTION



we secured a figure on the percentage of families serving vegetables in such combinations and it totaled a sizable 31.4 percent of all families.

The other kinds were dried vegetables, such as dried beans. These totaled 2.8 percent.

These percentages do not add up to 91.3 because, of course, many families served fresh as well as canned or frozen, or perhaps all three. As a matter of fact, the average family served 2½ different kinds of vegetables each day plus those used on salads, in soups, or in stews.

Use of Fruits on an Average Day

About 84 percent of these families served fruit—70.6 percent fresh, 24 percent canned, 1.4 percent frozen, 3 percent in fruit salads or fruit cocktails, and 3.1 percent dried fruit such as prunes and apricots. Altogether, 1.8 different kinds of fruit were in the daily diets of these families.

The many uses of fruit in other forms, such as jams, jellies, pies, ices and puddings, were considered outside the scope of this study.

Use of Juices on an Average Day

However, we did collect data on the use of fruit juices as well as vegetable juices. More than two-thirds (68.7 percent) serve juices on an average day. Of these, canned juices lead with 34.3 percent. Frozen juices (mostly orange) were used by 26.9 percent, and fresh juices (such as squeezed oranges) by 15.3 percent. An average of 1.2 different kinds of juices were served each day.

Kinds of Vegetables Used on an Average Day

The different varieties of canned vegetables served during the week of October 26 reflect the seasonal factors.

The big four in the canned line were peas, used by 10.5 percent of all families; corn, 7.3 percent; string beans, 5.4 percent; and tomatoes, 3.8 percent. Canned tomatoes were much lower than they would be later in the fall and winter because the end of the fresh crop still was in abundant supply. Then follows baked beans, beets, asparagus, spinach, lima beans, and carrots, with others used by less than one-half of one percent.

Comparing these canned varieties with fresh vegetables served, we see the dominance of potatoes on more than half the family tables daily, followed by tomatoes, carrots, lettuce, string beans, cabbage, cauliflower, and celery. Most fresh summer crops like peas, limas, corn, and asparagus had slowed to a mere trickle, perhaps from southern or hot-house suppliers.

The frozen competitors are led by peas, far in the lead over lima beans, string beans, broccoli, corn, and spinach. These six popular frozen items account for 75 percent of the frozen vegetables used.

Kinds of Fruit Used on an Average Day

In canned fruit we found peaches far ahead (7.9 percent) with pineapple a clear second (4.6 percent). Mixed fruit and pears are followed by apple sauce and cherries. Below one percent were found apricots, grapefruit, and plums.

In fresh fruit, this was the big apple season, and 44 percent had apples. Other fresh fruit in popular demand were bananas (18 percent),

RAYMOND A. ROBINSON

oranges (14.7 percent), pears (11.2 percent), grapes (9.6 percent), and grapefruit (8.3 percent).

Frozen strawberries led the demand for frozen fruit (but less than one percent) with peaches second and grapefruit and raspberries next.

Kinds of Juices Used on an Average Day

Among canned juices, tomato juice was served by more than one in every 10 families; canned orange juice came next, followed by pineapple juice, grapefruit juice, prune juice, grape juice, and apple juice.

The strength of frozen orange concentrates was indicated by the fact that 24 percent of the housewives said they had used it yesterday—more than twice the number serving fresh orange juice and nearly three times the canned orange juice.

If you add up the three forms of orange juice—fresh, frozen, and canned—you find 43 percent of all families using this favorite juice on an average day.

Effect of Income on Daily Use of Vegetables

The accepted economy of canned vegetables and canned fruits is demonstrated to us by homemakers in many ways and is one of the outstanding findings of this survey. However, the percentage serving canned vegetables reaches its peak neither in the lowest nor the highest income brackets, but in the middle ranges. And this finding is confirmed by other home economics studies. From 35 to 36 percent of the middle income brackets served canned vegetables daily, compared with 34 percent in the lower and 31.8 percent in the higher incomes. These differences, however, are comparatively small.

Frozen foods have a quite different relation to income. Only 7 percent of the low income families serve frozen vegetables on an average day, and this percentage increases as income rises, reaching 26.9 percent in the higher income groups. The ratio of canned to frozen is nearly five to one in the lower incomes but nearly equal in the top bracket (over $10,000).

Effect of Income on Daily Use of Juices

A somewhat similar picture is found in canned juices.

In the frozen juice field we find only 17 percent of the families in the lowest incomes using frozen juices but this expands as income rises, reaching a total of 41.5 percent in the top bracket using them each day.

Although these figures do not establish anything drastically new, they do seem to dramatize the differences in market patterns between the canned and the frozen products.

Effect of Age of Housewife on Daily Use of Canned Vegetables and Fruits

To see whether age had any effect on use of canned foods, we divided our housewives into four groups: those under 25 years, those 25 to 35, 35 to 45, and 45 years and over.

The younger women use canned vegetables considerably more: 43.6 percent among those under 25; 39.1 percent among those aged 25 to 35; and 30 or 31 percent among those past 35 years.

One can only rationalize on the reasons for this. It seems fairly obvious, however, that in these younger years both time-saving and money-saving are acute problems. Many of these young wives work; many more are raising babies. These nutrition-wise young matrons have of necessity learned how to get maximum food value for their families at lowest cost of time and money.

In canned fruits the age factor is not as great. The younger housewives use them slightly more.

Effect of Children on Daily Use

Results of the survey on the age of housewives suggested a look into an-

other family characteristic: effect of children on consumption.

Here we found that the use of all vegetables—fresh, canned, and frozen—increases in children families. The differences are slight in fresh vegetables and frozen vegetables, but there is considerably increased use of canned vegetables in children families.

Fresh fruits show a substantial increase in diets of children families, as do canned fruits.

In the juice field the frozen concentrates seem to have sold the parents' market; use increases 50 percent in children families as compared with non-children families.

Daily Use of Vegetables by Geographical Areas

When the sample is broken down by four geographical areas—East, South, Central, and West—the most striking fact that emerges is the uniformity of this great national market of ours. The differences in use of vegetables are not as striking as the similarities.

It would seem that the Midwest and West used more fresh vegetables during this week of October, the East and South were strongest in use of canned vegetables, and the West and East led in frozen vegetable consumption. This ranking is largely confirmed in the Department of Labor study of consumer purchases—but again the differences are not great—and by other studies kindly supplied me by your own statistical service.

Canned Foods Compared with Fresh

It is always easier to express quality or value of a product when you have some kind of yardstick to compare it with. That is why we asked housewives opinions regarding quality and price of canned foods compared with both fresh and frozen varieties.

It was found that 55 percent voted the quality of fresh vegetables and fruits better than canned. But 30 percent found canned vegetables and 25 percent found canned fruits to be at least the equal of fresh, and 9.8 percent found canned vegetables and 14.5 percent canned fruit better in quality than the fresh produce they were buying.

Both canned fruit and vegetables were given a great tribute on the score of economy. More housewives voted in favor of the canned as less expensive than the fresh. Perhaps they considered the lack of waste and freedom from spoilage as part of that economy. About one-fifth said, wisely, that economy depends on the season, and another 12 percent found it difficult to generalize and said they didn't know.

However, these answers left no doubt whatever that housewives considered canned foods a very thrifty buy. This point is more sharply emphasized in comparison with frozen foods.

Canned Foods Compared with Frozen

Women customers rate the quality of frozen vegetables higher on the average than the canned. But the reverse is true of canned fruits, which surpass their frozen competitors in the opinion of these housewives.

And in price the canned article is considered far more economical than its frozen counterpart by an overwhelming vote of 10 to 1 or better.

Frequency of Serving

Now we have the competition with fresh and frozen foods and concentrate on canned foods alone.

In an endeavor to find out how often housewives served canned foods, we asked them to think back over the past week and try to estimate on how many of these seven days they served canned vegetables, canned fruits, and canned juices.

The average housewife served canned vegetables about every other day. But 15.5 percent served them every day and 18.4 percent five or six days of the last seven. About 26.5 percent served them three or four days and 21.5 percent one or two days. Only 18.2 percent didn't serve them at all; this means that nearly 82 percent were canned vegetable customers during that one week's span. The canned foods market is practically universal.

For fruits, 69 percent served at least some canned fruit during the week's time, against 31 percent who did not; and two-thirds of the users served them three or more days a week. This includes both meals and in-between snacks.

Nearly 65 percent used canned juices against 35 percent who did not during the week, and among the users more than half served them regularly every day or at least five to six days a week.

Reasons for Infrequent Servings

This brings us to what might be called the sales resistance. When a housewife told us she didn't use any of these three types of canned foods during the past week, or only used them once or twice, we asked her how it happened that she didn't serve them more often.

The answers from these less frequent users reveal not so much the disapproval of canned foods—although, of course, we got some of that—but the preference in different degrees for fresh produce, frozen, or the home-preserved article.

The biggest reason for not serving canned vegetables is preference for fresh (37.5 percent). When they give a reason for their preference, it usually is on grounds of either taste or nutrition.

The number preferring frozen is only 14.5 percent; 12.4 percent said they disliked the canned. The main reason was taste. Some mentioned cost. Others said that only certain varieties appeal to them. Less than one percent said canned vegetables are too soft or overcooked. Some 12 percent use home-preserved vegetables—either home-canned or home-frozen—instead of canned.

In the canned fruit field the fresh fruit is preferred by many but the frozen fruit is not as serious competition as in vegetables. Only 2.8 percent cite use of frozen as a reason for buying less canned. Home freezing and preserving cuts into the canned market by 13.7 percent of this group. The specific dislikes apply largely to taste or expense, but 3.7 percent do not like the sweetness or fattening syrups in canned fruit and a small 1.2 percent say cans are unnecessarily large for their families; this explains the popularity of the smaller cans.

In the canned juice line the frozen orange concentrate and the fresh fruit are the main reasons for not buying canned juice. A very few specific gripes show up—none over 2 percent—such as the canned taste of the tin, is indigestible, taste acid, and so forth. Then there are people who prefer the fruit and don't drink juices.

Certainly the canning industry can feel satisfied at both the number of regular customers and lack of serious complaints. And wonder of wonders, nobody told us they were afraid to leave the food in the refrigerator in the open can. Time marches on!

Influences in Buying

We showed the housewife a card listing some of the things that influence people in buying canned foods and asked her which of these influenced her and which was most important. Let's look at the most important factor.

There is no doubt whatever that people look first for the brand names, and this has undoubtedly been strengthened by the trend to self-service. A total of 53.8 percent said the brand was their chief guide to purchasing. Next was, of course, price—mentioned by 26 percent as most important.

The size of the can is also of considerable importance; 11.5 percent say it is the thing they consider most important. Information on the label comes next in importance, mentioned by 5.8 percent; this includes the size of contents, the style of pack, the seasoning and so forth.

Only one percent say grocer's recommendation is the thing that guides them most. Special sales were mentioned as a factor by about one percent.

Factors Influencing Sale by Income Groups

Buying power naturally plays a part in these reasons for purchasing. When you separate housewives into five income classes, notice how the importance of the brand goes up as income rises—from 48.5 percent to 66.8 percent. Conversely, notice how the importance of price goes up as you move in the opposite direction—from 9.9 percent in the top bracket to 33.2 percent in the lower incomes. That is to be expected, of course, but it dramatizes the two factors of quality and price, which sometimes pull in opposite directions.

Size of can also affects pocket books and therefore is most important to less affluent buyers.

On the other hand, grocer's recommendation and grade or quality labels are more frequently cited by higher income groups.

Conclusions

To sum up, if you ask the American homemaker what she thinks of canned foods she will tell you, both in words and, more important, in actual purchases, that she fully appreciates the advantage of canned foods—their quality, their economy, their convenience and their storageability.

Reflecting this consumer interest, the publishing industry which serves these same consumers is also appreciative of the growing place of canned foods in the diets of the American family.

Citing two or three examples from sources I happen to know about, the *Woman's Home Companion* editors ran this helpful article last year entitled, "They'll Save You Time and Money"—"try these delicious recipes with the canned fruits and vegetables on your shelf."

Collier's ran the article, "Need A Quick Meal? It's in The Bag," featuring canned foods, and merchandised this through the leading super markets. The *American* magazine devoted several pages to the theme, "Science Takes Over Your Kitchen." These are just a few examples which illustrate my point.

The data given by these housewives point to four ways in which the consumption of canned foods may be broadened. First, by getting more families to use canned foods; second, by getting them to use them more frequently; third, increasing the different varieties used; and fourth, by the natural growth of population, with new families continually developing at the current rate of over 1½ million per year.

The characteristics of canned foods lend themselves particularly well to modern merchandising methods. We hear sometimes, however, that canned foods don't return the markup of some other grocery items. But neither do they require the same expense in handling.

But why not endow them with added profit for the retailer? Why not package them in cartons like soft drinks, beer, cigars and cigarettes—and like the breakfast foods variety-pack which also acts as a sampling device? Three of the larger cans or six of the smaller ones would make a convenient carton and step up sales and profits. These cartons might be assembled from one variety or several varieties and would lend themselves to convenient storage on the pantry shelf so that mom would always have a meal or a snack handy for the unexpected guest.

And finally, better than any other grocery item, canned foods could capitalize on automatic vending, which many believe will greatly expand in the years ahead. If the retailer could set aside an entrance niche or portion of his store for automatic coin machines, he could relax at home while sales rolled in, after hours and on Sundays and holidays. This device would meet the continued pressure for lower selling costs and would be an added service to the public which must rely on delicatessens or next door neighbors when unexpected guests arrive or food runs short after shopping hours.

With the miracle of mass production plus the revolution in food merchandising that has been going on through the last 20 years, the customer is buying today more food per dollar than ever before. But she is buying food service—not food alone.

Just as the industrial revolution took the burden of production off the backs of labor and placed it on machines so our merchandising revolution is taking the burden of selling off the shoulders of the individual sales clerk and putting it on machines. Today we sell by machinery as truly as we manufacture by machinery, our machines being the printing presses. Advertising is selling housewives by the thousands instead of individually. Customers are presold before they even enter the grocery store. This is the machine age of selling. And it is the age which, it seems to us, fits canned foods best.

Marketing—The Job Ahead

By The Honorable John H. Davis, Assistant Secretary of Agriculture

It is important, it seems to me, that at this 47th annual convention of the National Canners Association, top billing is being given to a discussion of marketing. The canning industry and, in fact, all agriculture, is faced today with the job of doing something about marketing. We have learned a great deal about the job of production and all of its difficulties, but we have not kept pace in finding new and expanded markets for all of the products we have perfected. The canning industry has played an outstanding role in the preparation for market and the distribution of a long list of agricultural commodities, especially in the fruit and vegetable business.

I know that canning has been going on since Appert made his discoveries some 150 years ago, and I realize that this great country of ours has not been functioning as a free nation much longer. But, considering how long man has lived on this earth, the United States is still a young nation and the canning industry is just a vigorous youngster in the food field.

I say this with the complete knowledge that it must be a pretty out-of-the-way place in the world today where a can of food from the United States hasn't been opened and eaten. And I say it with the sincere hope that the future will see a lot more of those cans all over the world.

It is often emphasized that a prosperous agriculture makes for a prosperous nation and, as the President has stated on more than one occasion, it is our aim to promote a healthy and prosperous agriculture. More than 20 million people operating over 5 million farms produce our raw agricultural materials.

Times have changed and are changing very rapidly in the world today. In agriculture we are moving rapidly toward increased specialization and increased commercialization, both in production and in marketing. Within the memory of some of you a large part of our agriculture operated on a subsistence basis. Most of the necessities of life were grown or fashioned on the farm. There was little need for cash income—and indeed there was little cash. Today with our increased specialization, farmers generally are doing those things which they are best suited to do. They buy from others the things they need for doing these jobs. Today, farmers make a substantial cash outlay for the seed, fertilizer, pesticides, machinery, and other things needed to produce a crop. They are constantly increasing yields per acre and output per man-hour.

Increased specialization and commercialization has not been confined to farmers. The whole nation is going in for processing in a big way. Some of our foreign neighbors accuse us of being gadget conscious. They say we spend more time fiddling with gadgets than we spend in any other enterprise. But American consumers continue to demand and buy increased services

and increased processing of food products. Apparently, consumers want food products as nearly ready to eat as possible and industry is moving farther and farther into the field of food processing.

In the canning and procesing industry producers and canners have teamed up to provide the essential elements necessary to do this job. There must be close cooperation between the farmer and the processor. The farmer is dependent, in many instances, upon the processor for a market, and the processor must depend upon the farmer for the raw material. The use of contracts in the production, especially of vegetables for processing, is an example, not only of cooperation, but of risk sharing.

We have many problems but the big job ahead is to develop, improve, expand, and broaden our markets, both domestic and foreign. The canning industry is and always has been a growing enterprise. This is not merely coincidence; it is not only a trend of the times; it is the result of vision, conviction, determination, and a lot of hard work. The multitude of people gathered here today is testimonial to the importance of the canning industry and to the progress that has been made under our free competitive system.

The canning industry has been devoting a good deal of attention and effort and resources to the promotion of its products in the domestic markets. This is a demanding and unending job. I am especially interested in what you in the industry and we in the Department can do to develop increased outlets beyond our borders. For a number of years the Department has had a few specialists abroad, digging into the needs of particular markets and exploring what domestic industry could do to open up new areas for our products.

Before the war, export outlets were especially significant for canned fruits. Immediately before World War II nearly 15 percent of the total United States canned fruit pack was exported, primarily to European countries. The United Kingdom was the biggest foreign buyer. Since the war, however, many of the European countries have experienced currency difficulties and have endeavored to obtain their needed supplies from soft currency areas. The United Kingdom market as a result has been practically closed to United States canned fruit. The British have tried to get their canned fruit supplies from sterling areas, but these sources have not made up for the loss of imports from this country. It is encouraging to note that exports to Canada and a few other areas have been increasing, but this volume has not nearly offset the loss of the British market.

The canning industry, however, has made tremendous strides in expanding domestic markets to make up for the closing of export outlets. But recent stock levels of particular items indicate that foreign outlets for canned fruits will find renewed interest.

The Department has been doing everything possible to urge European countries and particularly Great Britain, to open up their markets to United States canned fruits. We want to do anything that can be done to assist in developing foreign markets, short of governmental trading. It is our view that any such trade should be carried on by private industry. We have recommended that certain canned fruits be included under Section 550

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of the Mutual Security Act. Private industry can take part in this program, which permits the foreign buyer to pay for the product with his own local currency. We hope that this may provide a means of at least getting our toe in the door in our effort to regain markets in which we formerly did a great deal of business.

While we must maintain this constant search for new markets, we must also keep production in a fair balance with demand. Many of you are familiar with the Department's effort to advise producers and those engaged in marketing, including canners, concerning acreage to be planted to vegetable crops for fresh market, as well as for processing. We have tried to analyze all available data. The best brains of the Department have worked together to determine a proposed acreage which, we believe, under normal growing conditions would produce a supply which could be moved into the market at reasonable returns. Such acreage recommendations have been published separately for vegetables for processing.

Generally speaking, producers have kept their acreage in line with the recommendations of the Department. In a few instances, however, there have been substantial overplantings, with serious marketing consequences. We believe that this work in acreage recommendations is one of the best methods to help keep the supply of the various vegetable crops in line with the market demand. We had hoped our suggestions for 1954 would be available by this time. However, by attempting to arrive at our conclusions before all of the preceding year's pack data were available has subjected us to some criticism. So, this year we waited to have such information available for 1953. We just couldn't quite meet the deadline of your Convention, but you should have our acreage guide suggestions shortly after you get back to your offices.

Every fruit and vegetable canner is familiar with Defense Food Order No. 2, commonly called "the set-aside order" for canned fruits and vegetables, which has operated for the past three years. As you know, this program from its beginning was requested by and, in fact, insisted upon, by the Department of Defense, as well as by the canning industry. By use of the set-aside orders, the Quartermaster General has been able to procure the needs of all the armed services. He has been able to obtain canned fruits and vegetables in the size of container and type of packaging required. We have tried to administer the order in a fair and equitable manner, and I think there has been very general satisfaction with the program.

There is some question in our minds, however, whether a set-aside program should be continued this year. As far as I know, there is no shortage of any particular canned fruit or vegetable; in fact, we are on the long side in a few instances. In view of this, it seems a bit of a paradox for the Department to be on the one hand requiring a processor to set aside specified commodities for government use, and on the other hand, be confronted with the problem of finding a market for excess supplies. We hope you will give this matter very earnest consideration with the view of accomplishing the task of furnishing military requirements without resorting to any mandatory order.

Perhaps the most intimate contact the Department has with the canning industry is through the grade standard development program and the operation of the inspection service for processed commodities. The Department develops and promulgates standards of quality for a long list of

processed products which you folks pack. We maintain service covering the entire United States, Hawaii and Puerto Rico for the inspection and grade certification of such commodities. Most of you, at least, are familiar with the various types of service offered, as well as the use made of the federal inspection certificates. You are also well aware that the fees you pay for inspection are used to operate the service. In order to make the service self-supporting, it appears necessary to make some increase in inspection fee rates. An announcement of the proposed schedule of fees was released yesterday.

Some of the people connected with the inspection service are in many of your plants almost every day and are well known to you, as well as to the allied industries. The expanded use of the U. S. grade standards and the Department's inspection service over the past several years is an indication that these services are of considerable value as aids in marketing processed foods.

The grade standards are developed in close cooperation with the industry. We desire to make every effort to conduct the inspection service to meet the needs of all parties concerned. The value and success of these services depend largely upon the support given them by the industry. Greater use of the standards and inspection service should be of great value in expanding markets—particularly now as we face a buyer's market on many fronts.

Undoubtedly you have heard of, and perhaps some of you have been consulted concerning the recent reorganization of the Department of Agriculture. As is usually the case, a great deal of public attention has been directed toward the price support functions of the Department and the manner in which such activities will be administered. While price support is in the headlines, I want to assure you that a great deal of attention has also been given to the development of a marketing program. I cannot emphasize too strongly the very critical period in which we find ourselves from a marketing standpoint. The more I see of the operation of governmental farm programs, the more I am convinced of the increased attention we need to direct toward marketing.

The new setup in the Department establishes an Agricultural Marketing Service and a Foreign Agricultural Service, both of which are under my general supervision. It will be our policy to direct increased resources toward the study and development of this important field of marketing.

Research and development represents a zone of activity which the processing industry, the government, or anyone else, cannot afford to overlook. It is needless to repeat here the almost miraculous results which have been accomplished through diligent research work. Industry is far ahead of government in the field of research and I believe should be. Agriculture, composed of several million individual units, cannot engage in research on a par with close-knit industrial corporations. Government, therefore, must take over a part of this load, and the Department has long worked toward a comprehensive research program. We think that research must be continued and strengthened wherever possible to better serve the long-time needs of agriculture. The newly established Agricultural Research Service has been designed to give a maximum of attention to this need. Marketing research will be continued and expanded under the Agricultural Marketing Service. Many of you now are cooperating in projects undertaken in this field.

For a good many years the Department has administered a statute known as the Agricultural Marketing Agreement Act of 1937. This Act and the programs authorized under it are unique, in that they are enabling in character and permit the development of a program to fit the needs of a specific commodity or industry. Marketing agreement programs, we believe, provide a concrete basis for an industry to help itself on an organized basis.

There are requests from time to time for the use of marketing agreement programs for commodities not now permitted under the statute. This raises the question as to the desirability of extending the Agricultural Marketing Agreement Act, for example, to fruits and vegetables for processing. But we recognize that there are problems involved in deciding just how this could and should be done. The problem stems largely from the fact that in this case the parties regulated are the processors, not the producers, though the producers would also need to share in the burden of any regulation designed to adjust the supply of the raw product to demand.

Consequently, what regulatory provisions of the statute should be authorized in the processing field and to what extent would present a very practical problem. It is only fair to state that fruit and vegetable processors generally have not favored extending the Act to cover the raw products they use, or the finished processed product. On the other hand, producers and producer organizations are demonstrating more interest in obtaining such additional authority than they have at any previous time.

We in the Department are hopeful that producers and processors can reconcile their views to the end that the limitations of the present statute may be eliminated or, at least, reduced. We need to discuss this subject further with producer and processor groups, and it is our intention to do so. We stand ready to work with your organization on this problem at any time.

The major objective of a marketing agreement program is to facilitate orderly marketing and improve prices to producers with parity being the goal. For fruits, especially, raw product prices have been varying considerably from year to year, depending upon the supply of fruit. As you would expect, prices in years of heavy supply are often substantially below parity, as contrasted to years of normal or short supply, when prices are usually near the parity level. Oranges, grapefruit, and a few other products are exceptions. The prices of these have continuously been below the parity level. Prices for vegetables for processing over the last several years have been more stable, with last year's contracts averaging about parity or some better for the main crops.

It is our belief that marketing agreement programs should be available where they can be utilized to advantage. It is not wise or expedient to develop a particular program for the benefit of one group at the expense of another. It is our hope that producers and processors can find a middle ground toward which the efforts of all may be directed. Despite your previous or present views, your cooperation in objectively considering the role of such programs as an aid in stabilizing—and I submit, not controlling—the marketing of a commodity is solicited in all seriousness.

Although you are a highly competitive industry, it has taken cooperation within your ranks to bring your industry to its present stature. Much of your spectacular development has been in the last half century where, for example, the packs of canned fruits and vegetables have increased from 34 million cases in 1904 to more than 500 million cases in recent years. This is a 15-fold increase. It is obvious, viewing this growth, that your advancement has been the product of continuing change and improvement. You have shifted successfully through the years to meet the changing demands of war and peace.

I am sure this great industry will continue to develop new products and new methods in marketing as well as in production to supply an ever-expanding market.

N.C.A. Resolutions Oppose Marketing Orders and Take Stands on Government Procurement and Hale Bill

At the Annual Meeting, N. C. A. members unanimously voted resolutions dealing with marketing orders for canning crops, the general requirements for a satisfactory government procurement program, interstate barriers by particularized state requirements, and the proposal to simplify food standards-making procedures.

These resolutions were among those reported by the N. C. A. Resolutions Committee. The report was presented by Chairman Henry P. Taylor, who read the full text of the resolutions.

Federal Marketing Orders

The constantly growing canning industry is never static. Extension of its processing techniques to new and vast growing areas has benefited growers and consumers alike. Experience has repeatedly demonstrated that the complex problems of planning the production and marketing of canned foods are best resolved in the American tradition of free enterprise, competitive incentive, and imaginative, individual business resource. To substitute government marketing orders, controlling production and distribution, would be to disservice both agriculture and the canning industry. To regiment processing against the judgment and without the consent of those regulated is unsound, unfair, and undemocratic. This Association unalterably opposes any extension to canning crops of involuntary licenses or compulsory marketing orders under the federal Agricultural Marketing Act or any comparable statute.

Government Procurement

Current international and domestic conditions warrant reiteration of the canning industry's firm conviction that effective government procurement of canned foods—on which our armed forces are so vitally dependent—should be grounded on governmental recognition of certain principles. An equitable sharing of the responsibility for military supply among all members of the industry is a desirable element of a fair program. Procurement procedures should be impressed with the principle of maximum conformity to the commercial buying and selling practices normally prevailing in the industry. There should be equal and non-conflicting application of the national labor laws to both civil and military production. All procurement procedures should embrace a consistency of pattern and a continuity of operation sufficient to permit a ready transition to periods of greater or lesser military need. Legislative enactments and administrative regulations which fail to accord full recognition to these principles constitute impediments to the efficient fulfillment by the canning industry of its manifest obligation to the defense needs of the nation.

Interstate Barriers by Particularized State Requirements

Consumer interest in both effective competition and the widest availability of all food products necessitates that any informatively labeled wholesome food be permitted to be sold freely throughout the United States. State or local regulation that imposes requirements needlessly extending the adequate protections afforded by federal law serves only to hamper and to impede the free interstate distribution of canned foods. The National Canners Association urges upon all state legislatures, administrative agencies, and local officials these paramount consumer interests. Any regulation that specifies particularized labeling requirements, or prohibits ingredients authorized by federal law, or standardizes products to reflect local preferences, inescapably creates unwarranted interstate barriers and defeats the interests of consumers, canners, and growers alike.

Food Standard Procedure

Historically, the canning industry has enthusiastically sponsored the promulgation of reasonable federal standards of identity, minimum quality, and fill of container where necessary in the interest of consumers. To this end the industry endorses the pending Congressional proposal to simplify the standard-making procedure and to limit public hearings to controversial issues. On regulatory proposals predicated on disputed questions of fact or asserted opinion, to which timely objection is made, the industry reasserts its conviction that the statutory safeguards of a public hearing and the verification through cross-examination of both fact and opinion are essential to the reasonableness of any regulation to be issued under the Federal Food, Drug, and Cosmetic Act.

Louis Ratzesberger, Jr.

American tradition has always welcomed men who come out of Illinois, sturdy in character, seasoned in judgment, and experienced in local and state activity, to assume a warranted role in national affairs. Historical example has been abundantly confirmed in the splendid service of Louis Ratzesberger as President of the Association. To this demanding task he brought a rock-like integrity, a penetrating and perceptive mind, and an insatiable appetite for hard work. Competence and capacity are always modestly clothed in a quiet and gentle manner. Infinite patience and innate courtesy never yield to controversy. Devotion and zeal in productive performance are founded in sincerity and seriousness of purpose. From these qualities the Association has derived enduring benefit. Because of them Louis Ratzesberger soon commanded the unsought commendation, the unstinting praise, and the warm affection of canners throughout the nation. To him the industry and this Association express their immeasurable gratitude.

National Canners Association Staff

The postwar problems of the canning industry have manifolded the responsibilities of this Association and massively contributed to the burdens of its staff. Yet these additional demands have constantly been met neither with delay nor impairment of excellence in performance. The Association expresses its appreciation to Carlos Campbell and his staff for their continued devotion, zeal, and competence in the execution of these increased and difficult assignments.

Guest Speakers and Allied Trades

The success of a National Canners Association Convention depends upon the hard work and cooperative spirit of many diversified elements. Our guest speakers, the allied industries, newspapers, radio and the trade press, have each effectively contributed to the success of the 1954 Convention. The Association is sincerely appreciative for all that they have done and directs the President and Board of Directors to convey its gratitude to each of them.

Necrology

The yearly cycle brought, as so surely it must, a sad toll of men whose untimely passing leaves bereft their many friends in work and market place. Their active service has ended; their efforts yet endure. Though poignant our loss, we reverently cherish the memory of

William Bewley
Daniel D. Conway
Benjamin L. Cooley
Daniel Woods Creeden
A. F. Dreyer
G. R. Garretson
John S. Gibbs
Walter J. Kemp
Frank H. Langsenkemp, Sr.
Glen F. Mason
Arthur E. Nash
Fern L. Shannon
O. Eugene Shostrom
Ausley O. Stephens
Henry Porterfield Taylor, Jr.
Ralph Tratt
Leonard E. Wood
Paul Wormser

MERCHANDISING CANNED FOODS

Your Customer Today

By Charles Pearson
and Arthur H. Chadwick,
Life Magazine

In talking about our customer today, our subject is people—honest to goodness, flesh-and-blood individuals and not just bundles of statistics. If there's one thing we can be sure of, it's the fact that our customer is not an imaginary someone with an income of exactly $4,320 per annum who lives in a house with 4/7 rooms, who has 1⅝ children, and who is 47 percent male and 51 percent female.

No, our customer today is a very unstatistical character with individual likes, dislikes, and individual buying habits. In fact, he or she is in many ways much more independent than ever before. And if we're going to serve them and sell them, we'll have to keep this fact firmly in mind.

The first important fact about our customers today is that there are so many of them. In the past decade our population has grown by over 19,000,000. And even more important for our purposes is the fact that today we have 14,000,000 more families than we had only 10 years ago. And although the postwar rush to the altar has levelled off somewhat, we still had more marriages last year than a decade ago. In the late 30's, the national birth rate began to rise after more than 50 years of steady decline. It slipped back again after Pearl Harbor, but after the war, it rose rapidly to a rate of over 25 births per thousand population, the highest rate since the early 20's.

As a result of this trend, by July of this year, we had 65 percent more children under 5 and 50 percent more children 5 to 10 than in 1940. And this figure means more than just a great market potential for 1960 or 1970. It means a tremendous potential right now for food and food products of every kind. The fact is further borne out when we consider the great increase, not only in the birth rate, but in the number of families who are having two, three, and even four children.

Between 1940 and 1951 the number of first-born children increased by 47 percent. At the same time the number of second-born increased about twice as much—91 percent. Third-born showed an increase of 86 percent, and fourth-born, 61 percent. The increase in birth rate, interestingly enough, is greatest among well-educated people. Apparently those of our customers who are best able to buy are willing to bear the cost of larger families.

But these facts also have a significance above and beyond that of market potentials. While demonstrating their faith in the future, young married Americans are also evidencing their interest in centering their lives in their family and their homes. What better example than that wonderful new institution—the baby sitter?

There are many signs that our customers today want their lives to be home-centered, but not home-dominated.

Americans have done a tremendous amount of moving from one house to another in recent years. Every year since the end of World War II, about 28 million people have moved. Significantly, part of this movement has been away from the relatively limited life on farms to the more varied opportunities of urban centers. In contrast to the tremendous growth of our total population, farm population continues to decline.

Paralleling this shift is the trend to home ownership. Ten years ago, only 44 percent of American families lived in their own homes. The rest rented. In 1950, for the first time in modern history, more people owned than rented, and the trend is continuing. However, of all the statistics we have cited, here is one that will be of most interest to us in the food business:

American consumers are not much interested in, or successful at, keeping records of their personal expenditures. They are largely unaware of the single biggest change in their postwar spending habits.

They would probably be astonished to learn that the major alteration in their living standards, measured in dollar value, does not relate to new homes in the suburbs, to new television sets, to the 16 million new automobiles bought in the past three years, or even to all of these combined.

It related, rather, to food. Americans are now giving about 30 percent of all their consumption expenditures to food—the highest percentage since the first world war, and probably since the turn of the century. The revolution in eating has been a quiet one, and it is perhaps not too difficult to understand why. Food is the largest expense consumers have, and the most frequent one.

American consumers are certainly aware that they are spending a good deal more for food today than they were during the 1930's. But most of them, it's probably safe to surmise, attribute the increase to price inflation alone. That is only partly the case.

Far more important is the simple fact that Americans, whether they know it or not, are eating better than at any time in their history. What's more, the food they are now buying contains a whole slew of built-in services designed to take most of the drudgery out of cooking.

Look at what's happened since 1935. In that year, consumers spent about $13.7 billion for food. Since then, the price of food has increased by 130 percent, and the population by almost 25 percent. To eat as well in 1953, we would have to spend about $40 billion on food.

But we are not spending anything like that amount; instead, we are consuming food at the staggering rate of about $66⅔ billion a year. The difference of $26 billion may be considered, therefore, to be roughly what Americans are investing in better—and more convenient—eating.

Let us consider the 30 percent of their expenditures that consumers are allocating to food purchases. In 1929, when the Commerce Department began to measure consumption expenditures carefully, a quarter of all the money spent by consumers went for food—just as the textbooks said it should.

During the hungry 1930's, the percentage hung between 22 and 25 percent. When the U.S. went to war, consumers immediately began to spend more for food. The 1942-45 average was around 28 percent. But that steep increase was due, of course, to the general unavailability of other goods which consumers presumably would have preferred to spend money on.

As consumer goods slowly became available after the war, economists were almost unanimous in expecting the food percentage to turn down again, and sharply. But by mid-1948, when the last of the deferred wartime demand for nondurables had been cared for, consumers were still spending 29 percent for food.

By the end of 1951, when the production of durables finally caught up with deferred demand, they were spending a fraction over 29 percent for food. The 30 percent figures is an estimate based on preliminary Commerce Department figures for this year.

Actually, far from anticipating a rise in the food percentage, most students of the market were confident that it would sink to a level lower than prewar. Their expectation was based on the general proposition that as incomes rise, the percentage going for food declines.

Food consumption over the past seven years indicates exactly the opposite! What made food a $66⅔ billion market? Though the country is spending more for food than ever before, diet-conscious Americans could never be labeled gluttons. The U.S. is eating better than ever. Some cate-

gories have jumped, others have declined.

Per capita consumption of flour and grain products is off by 13 percent from the 1935-39 averages. Potatoes are off by 30 percent. But meat is up 21 percent, vegetables are up 15 percent, eggs up 42 percent, and dairy products up 11 percent. Thus we can see what has changed is the kind and quality of the food consumers are eating—not the quantity.

Equally significant, and of most importance to you here today, is the solid position that canned foods occupy in the total market picture. Annual per capita consumption of canned fruits is up to about 20 pounds.

Yearly consumption of fruit juices is at about 13 pounds per person, and Americans, on the average, are consuming a healthy 41 pounds of canned vegetables yearly.

Annual packs of canned fruits and vegetables have virtually sky-rocketed in the last 30 years to a point well over the 500 million case mark. Certainly the canning industry must be given a full share of credit for the fact that Americans are eating better than ever before in our history.

And we see here that, along with this great contribution to better eating, you canners have done more than any other factor in the food industry to hold down prices. This index clearly shows that consumer prices for your product are substantially lower than those of the food industry generally.

It is hard to assign any precise dollar value to the "convenience" component of the U.S. food bill today. It is, however, perfectly obvious that not all the swellings in the bill can be accounted for by the food itself; and it is also obvious that the purchasing and preparation of food have been made dramatically easier for American housewives—at a substantial price. The demand for cooking convenience has origins which are fairly obvious.

In brief, the postwar rise in incomes has been accompanied by a reduction in the time that homemakers can labor in their kitchens. About 30 percent of them hold full-time jobs today, compared to only 24 percent in 1941.

Furthermore, the availability of maids, who might have solved the problem in an earlier day, has been sharply curtailed. There are fewer domestic servants in the U.S. today than in 1890.

But the major difference is economic. In the 1930's, consumers, perforce, addressed themselves to food purchasing in a generally parsimonious spirit; today, they are less concerned with reducing expenses than with reducing work in the kitchen. And so, instead of getting a maid, or giving up her job, the homemaker has let the food manufacturers and retailers do a lot of the work for her. Virtually all the food she buys today is prepackaged, and a sizable portion of it has been precooked and divided into portions as well.

You no longer hear jokes about young brides whose talents in the kitchen are limited to a knowledge of the can opener; 20 billion pounds of canned food are now going down the national gullet every year, and the point of the joke, in consequence, has been somewhat blunted. Home baking of bread and home canning have become the hobbies of the leisured, rather than the chores of the frugal. A quarter of the coffee sold in the U.S. today is soluble, and the proportion of "instant" is rising about 5 percent a year. More than half the chicken sold in the U.S. is precut. At the height of the fresh corn season, in August and September, the sales of canned corn dip by only about 25 percent. Only 40 percent of the oranges sold in the U.S. are marketed fresh. In many large super markets you can now buy a complete turkey dinner: frozen, apportioned, and packaged. Just heat and serve.

The upshot of all these trends is that the consumer's food bill today includes a vastly increased component for "marketing charges," i.e., the cost of getting the food from the farmer to him. It is not that there are more middlemen in the market today. Everyone knows of the successful efforts being made all through the chain of distribution to cut costs. It is only that the middlemen who have always been there are performing, at the consumer's insistence, a whole new range of fairly costly services. In 1945, marketing charges accounted for 46 cents of the consumer's food dollar; today they account for 56 cents, and their "bite" out of the dollar has been rising steadily.

Perhaps the best check on the fact that Americans are eating better than ever before is the market basket comparisons prepared by the U.S. Department of Agriculture. The 1935-39 market basket took 23 percent of the consumer's disposable income. The same market basket today would snare only 19 percent.

There is a general impression, however, that food has "gone up." It hasn't. Based on today's disposable income levels, food is cheaper than it was during the 1935-39 period. Getting this story over is a job for the whole industry. Actually what has happened is fairly obvious. The old "market basket" of a few staple items is no longer valid as a standard. In today's "market basket" we find a much larger variety of better quality foods in even greater quantity. Just as important to the housewife as the greater quality and quantity of her purchases is the multitude of built-in services she buys along with her groceries—services that will cut food preparation to half the time.

Today's family—eating better and living more leisurely—has changed in other ways, too. A new sense of pride in their homes prompts them to entertain more frequently.

And this new emphasis on the home calls for basic changes in selling strategies. The U.S. is becoming a one-class market of prosperous middle income people. Family units with $4,000 to $7,500 in real disposable income now comprise 35 percent of the total families. The number of families in this bracket has increased by 44 percent since 1947. The most important element in this phenomenal, new middle income market, the element that brought it into being, in fact, is the skilled factory worker.

He, in tremendous numbers, now has the money, and most important, due to shortened working hours, he now has the leisure time in which to spend it. By now, this large element has satisfied its basic needs and is presently expanding its tastes and interests to new products. In short, the skilled industrial worker can be sold up.

Just think what a tremendous potential this situation offers all of us. This rapidly expanding market seems bound, sooner or later, to become the American market. It's like no other middle-class market in history. The growing wealth and improved taste of the new middle market creates special needs. It's a new mass market for specialty items. In other words, a mass class market.

Years ago, manufacturers couldn't afford to make specialties because the market for them was too small. Today, this new great middle-income market has created a real demand for them.

Fewer and fewer products can be classified "exclusively for men" or "exclusively for women." The real sales target is now the entire family acting as a unit. This is a trend that is seen in every field of selling today.

Our editors know this and you'll find on close analysis that everything that appears in *Life's* modern living section is presented with the male viewpoint in mind.

Paradoxical though it may seem, while men have taken more and more interest in the home which was once strictly the woman's world, our women have taken more and more interest in the man's world, and are doing quite well at it.

Nowadays the phrase is either "Marriage is a career" or "Marriage and career in business too." And as we've already seen, the watchword of the 1950's seems to be "Everybody's place is in the home."

I think it was Shaw who once said: "Thousands of young women announce that they will not be dictated to—

and hasten forth to seek employment as stenographers." Now, however, jobs for women are not a subject for proclamations or revolutions.

Of the 44,000,000 women in the country between the ages of 20 and 65, over 19,000,000 women are employed in business and industry. And here is the most important fact of all: Marriage and career has become the rule for the majority. Now how does all this affect our selling in 1954?

For one thing, if the woman is contributing a major share of the family income, she obviously is going to have more to say than ever before about major purchases of every kind. And since her shopping time is as limited as her husband's, she's going to call on him to take a greater interest in family tasks and family buying.

So between their jobs and their homes, your best customers have little time to spend when the time comes to buy your goods. It's up to you to streamline your selling at every step of the process.

But changes in the patterns of family shopping are not the only, nor the most important, differences between our customers of today and those of yesterday. Like the world they live in, our customers' lives, their thoughts, their actions have altered in a multitude of ways in recent years.

They have seen war and its effect on their own personal lives. Today, the problem of Korea and the problems of the UN have far more meaning for them than did the Ethiopian Incident or the League of Nations for Americans of 20 years ago. Women as well as men know all about the effect of taxes and price controls and draft laws on their own day-to-day living. They have a vital interest in national politics.

Above all, our customer is better educated today than ever before.

In 1940 only 27 percent of our population had high school educations. Today, 41,600,000 Americans are high school graduates—over 40 percent of our total adult population.

The number of college graduates has increased even more rapidly—from 1.7 million in 1930, to 4.5 million in 1940, to over 6 million today. This year one-fifth of all Americans are attending educational institutions. And in the wake of this expansion has come a profound broadening of the cultural interests of our customers.

In the past 10 years, for example, attendance at art museums has quadrupled. In the same period, concert audiences have doubled. In fact, last year Americans spent more money for concerts than for baseball games.

Our customers have developed new interests in every direction. We have already seen that they have a new interest in improving their homes. A year ago, they spent $2 billion for do-it-yourself maintenance and three times as much money on their gardens as they did in 1940.

Visits to national parks have nearly doubled in the last eight years as has the number of people making trips abroad.

Our customer, by every indication, is open to new ideas in every field and we can sell him ideas about our products—but only if we sell hard enough. For there are a lot of other ideas competing with the ones we want to sell, and even though we as a nation are better off than ever before, the old consumer dollar just goes so far. But our customer does have enough money to act on your ideas if you really capture his interest.

And right here we would like to bring your attention to a selling job that will be done next year by one of the big can manufacturers. This campaign will be built around a series of ads which will run throughout the year in three top magazines. Each ad will attractively portray a different regional recipe such as a Texas barbecue supper. The menu will be shown ready-to-serve along with detailed recipes. Every item called for in the recipes will be a canned product. The purpose is to raise the stature of canned foods in the eyes of the American consumer and make Mrs. Housewife aware of the great variety of good foods you canners offer her. We can't help but feel that this campaign will do a great job of selling for every label in your industry.

The increase in American standards of living that has taken place since the war is truly phenomenal. The reasons of course are many:

The basic wealth of our country's resources.

Our unique political institutions.

And above all, the productivity of a population educated beyond the wildest dreams of the past—all these have contributed. The resulting market potential is tremendous.

Arno Johnson, one of the nation's foremost economists, states in his current analysis that if we, as merchandisers, can encourage Americans to live only 10 percent better than they are now doing, the resulting new money in circulation will more than offset any government reduction in wartime spending. And he goes on to show that, on the average, Americans can well afford to increase their current expenditures by 10 percent.

We've seen many evidences of our customers' desires to be independent and have homes of their own, to center their living and their buying, around the household unit. We have also seen that this new emphasis on the home reflects not a limitation but an expansion of their horizons.

The women of today know a bigger world than that of the kitchen and the nursery, though they are more anxious than ever to have families of their own. And men and women alike know that the world has grown smaller for them than it was for their parents.

The food industry's part in this world of today continues as vital as ever. No discussion is complete without recognition of the efforts and successes of the nation's canners in reducing the cost of food. Over the years, the record of the industry is outstanding.

As the operations of a peacetime economy once again approach us, this cost-paring will be even more important. Intelligent expansion based on sound financing will be more vital than ever. It may be the key factor in determining who best continues to serve his community. No manufacturer is of greater value to his country than the food canner. But as diligent and efficient as he may be, he does not exist in a vacuum. His success depends on the success of the whole community.

In the present state of our economy what are the prospects for the future?

As population continues to grow—and families form even faster—the market will continue to expand. The shift from rural to urban continues. Suburban growth shows few signs of slackening off.

Income and leisure time will undoubtedly increase as they have since the war.

With the growing awareness of the importance of good food to good health, our nation's nutritional standards will continue to rise, as they have in the past. But the biggest single change is the emergence of a great new market—the mass class market. Add these factors together and it is obvious that the trend to better foods of greater convenience will continue.

We at *Life* have called the 1950's "The Decade of Opportunity." In this period all of us will benefit, but some will benefit more than others. They will be those who see the opportunity most clearly and plan most wisely to take advantage of it.

The men of healthy optimism, the ones with faith in the future, will reap the big rewards in the decade that lies ahead. The men who believe in America—the challenge of the American system of doing business—will grasp the opportunity of these years.

America depends on your industry. For of all the vital functions in our great economy, the feeding of America's people stands highest—the growing, the processing, the efficient distribution of America's food. The well-being of present and future generations, the strength on which our nation depends is our responsibility. By pooling our resources—retailing, wholesaling, processing, and selling—and pulling together, we can meet the challenge.

The Business and Economic Outlook for 1954

By Edwin B. George,
Economist, Dun & Bradstreet, Inc.

A moderate jolt for the American economy has been in the making for some time, but we are likely to be spared most of its effects by the presence in 1954 of an extraordinary amount of so-called built-in flexibility —greatest in our history at this particular moment, and greater than we are likely to enjoy for some time to come. This quality derives from certain properties in the economic system that work automatically against prevailing cyclical pressures, and the manner thereof will be part of my story. More graphically these properties could be called "cyclical snubbers." The adjustment process really started last summer and could conceivably run its course while these features in the system resisting decline retain their special strength. That is not exactly a forecast of recovery in 1955 but except for the foolishness of foretelling political events in this tenterhook age it could point that way.

For the sake of perspective the factors that did the most to shape this temporary peak in the American growth curve should perhaps first be identified. Naturally, everything moved, but it is the order and vigor of movement in various parts of the system that makes the story, and one's beliefs about them is bound to influence his expectations. This particular observer's form sheet shows the course of the economy, as inferred from a direct comparison of results in the fine second quarter of 1953 with those expected in the fourth quarter of 1954, to be dotted with losses—most damaging in defense spending and inventory holdings, moderate in industrial equipment and personal consumption, and small in outlays for construction (both housing and business). This scale of values is in terms of absolute amounts; relatively, for consumer expenditures the decline would be trifling—it might not happen at all—and even for the sensitive category of industrial plant and equipment investment in the fourth quarter of 1954 might not fall much more than 10 percent below that in the big quarter of last year. And there will be offsets. State and local governments doubtless will intensify their efforts to make up arrearages in public works, institutions and roads, finances permitting. We will probably buy less of foreign supplies because of slackening tempo and they will keep on buying from us because of their need for our goods and some strengthening of their monetary reserves. On balance, however, this first look at retrospect (second quarter 1953) and prospect (fourth quarter 1954) seems to have dwelt more on losses than gains. Can we be more exact?

Sounding by Government

The economy will seriously miss the stimulus of a steadily rising rate of defense and security outlays. For over two years this incremental growth in a big program has by reason of its very predictability been helping to carry the country forward. After a series of increases, mere maintenance of a given rate of military spending, even after it became heavy, was always doomed to have the effect of a decline. And as usual the spectacular had to be underwritten by the substantial, reviving military might by new industrial capacity. To press the analogy investment in plant and equipment was likewise insured against any serious break during the past few years. Now both have turned down.

Perhaps the only open question about security expenditures is whether defense administrators will have as much difficulty in cutting to measure as they did in meeting goals on the way up. Some unexpected imbalances will result from spot cutting, new crises can arise, maintenance of strong forces in Europe may turn out to be the price exacted by insecure French governments for participation in the European Defense Community, lingering political doubts about the real changes of getting more defense for less money may harden into obstinacy, the Democrats may recapture decisive control of Congress, the fourth quarter of 1954 is still a long time away.

These are imponderables of the kind that make forecasting mostly amusing, but guesses have to be made. On the grounds that (a) it is easier to go down than up, and (b) reducing the size of the armed forces at least, as contrasted with changing equipment plans and schdules, is merely a housekeeping job within the control of the defense managers, this forecast will go along with Administration intentions and assume a gradual decline in military spending from the round $50 billion annual rate recorded in the fourth quarter of 1953 to something like $47 billion in the same period this year. There are not many words of wisdom to be said about this plain matter, except (a) to repeat that we have replaced the stimulus of quarterly increases with the depressant of quarterly declines, and (b) that if the economy does fall on its face in 1954, which is highly doubtful, it will not be for lack of a rate of defense spending that not long ago would have been regarded as stupendous.

Other federal purchases of goods and services (not to be confused with social security and other transfer payments) are relatively small. They have already risen a couple of billion since second quarter 1953 and under the economy hammer may by the fourth quarter be brought back to a point only one billion above our anchor period rate.

In a country that alternates unreasonably between crisis and apathy in security matters, state and local governments are caught in a perverse cycle. They have money when they can't spend it and financing problems when they can. Their need to build schools, hospitals, asylums, buildings, roads and dams is hardly to be questioned. Some have husbanded their funds and can command credit in the amounts and types needed. Others may have been less prudent or lack basic resources and be now unable or reluctant to meet the terms of the money markets on a scale commensurate with needs. On balance however their outlays will probably continue to expand—possibly to an annual rate in the fourth quarter of this year from $3 to $3½ billion above that of second quarter of 1953.

Action on Inventories

Inventories are behaving mischievously as usual. Few economists today underrate their importance in either initiating or aggravating cyclical movements, depending on circumstances and psychosis—at least not since Dr. Moses Abromowitz made his exceptionally informative study of their importance and behavior for the National Bureau of Economic Research a few years ago. From the first to the second quarter of last year the annual rate of total activity of the country in terms of Gross National Product leapt by a fresh $10 billion.

Perhaps too many reporters were proud and pleased at this new evidence of irrepressibility in the American economy, this time in the face of general business awareness that government spending for defense had reached and might even have passed the climax. Unfortunately about 60 percent of that leap was negotiated by inventory investment, and a good part of the rest might be accounted an afterglow of the passage of the inventory rocket. Rising inventories do not represent basic growth. They are a necessary means to growth, and changes in their quantity very frequently and for understandable reasons overrun broad cyclical movements originating elsewhere in the system. It is indeed a good thing that the secular trend has been in the direction of smaller inventories in relation to sales. In any event, most aspects of the climb in stocks that were reassuring in the last two or three years can no longer be so regarded. A couple of years ago it was possible, through a breakdown of inventory-sales relationship by classes of business, to discover that the most rapid rates of growth

were occurring in defense industries and did not bear an alarming relationship to the shape of the prospective business curves in those industries. As of present, however, the leaping industries of yesterday are either among the sliding ones of today or have attained their growth within the present milieu.

The question that concerns us at the moment, however, is, what will inventories do from here out? New orders by manufacturers declined 15 percent from April to November last year as contrasted with less than 5 percent in sales. The statement is frequently confronted that the shakeout of stocks occurring in the fourth quarter of 1953 was about all that is needed and that they are once again in pretty fair relation to sales. It so happened that they declined only at an annual rate of about $2 billion at most in contrast with jumps of $8.8 billion and $4.5 billion, annual rate, in the second and third quarters, but that is not conclusive either. Something more is involved.

It is worth taking a minute to distinguish some of the different ways in which inventory changes, so largely a subjective matter, can initiate or react to downward movements. The simplest, of course, is when producers come to regard them as unduly high for the business being done and tries to reduce them. But a decision merely to hold them where they are can touch off a chain reaction if general business had previously been buoyed up by a buildup in excess of sales. And last, there is such a thing as involuntary accumulation. Suppose some economist comes along who is having a bad season himself, and advises producers to stand pat in the face of declining business on the ground that all the auspices were good and that the decline was just one of those things. If the producer's inventory-sales ratio had been satisfactory for some time, he might be doubly inclined to accept the advice and his stocks would accordingly rise for lack of takers. Later on he might get really panicky and start to dump, thus first delaying and then aggravating the general decline.

Probably all of these things were happening in the last half of last year. Business stocks were a bit high in relation to sales—not alarmingly so—and acquisitions in the first half had been quite heavy. The subsequent change in inventory investment between the second and fourth quarters was larger than the total decline in G.N.P. ($10.8 billion vs. about $9 billion). But as noted at the outset of my remarks, some major activities seem likely to decline this year, and, in such situations some irreducible number of diehards will follow slowly lest deficiencies in their stocks cost them last-minute sales. They might conceivably be accompanied this time by automobile manufacturers and dealers if high output rates in the face of a somewhat deteriorating market are sustained. Sufficient strength in developments of this kind could push stocks up a bit in the current quarter and let them down abruptly thereafter. If this happens, the annual rate of inventory reduction in the fourth quarter might rise to between $3 billion and $4 billion, which in turn would mean a swing for the worse of over $12 billion (in annual rates), in the contribution of inventories to economic activity, and move them into

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place as the massive center of our year-end problem.

Private (Non-Inventory) Investment

Can private (non-inventory) investment hold the fast pace it has been setting with rarely a stumble since 1949? For several years now it has been tempting to predict a letdown on grounds of incredulity. That kind of thinking won't do, however, in a period that has broken out of prewar molds in so many respects—both structural and theoretical—for a period long enough to raise questions and not long enough to be conclusive. I regret at this moment that the scale of values I am using in this talk is governed so considerably by the amount of change I am anticipating in various kinds of activity. Through all sorts of vicissitudes private investment in construction and equipment remains the most dynamic factor in our enterprise system and I look at it principally for news of progress rather than of next year's business. However, the latter is the business now before us.

I fear that we are going to lose between $5½ billion and $6 billion worth of sales in this vital area—contrasting again our achievements in the peak quarter of 1953 with those expected in the last quarter of 1954. Let us first look at the prospects for construction, and within that big category, those for housing.

Housing has been pleasantly disappointing a number of its followers for quite a while. A million new starts a year is always good insurance for general business, and (including government housing to sweeten the record) we have topped that figure for years. We did it without the help of government housing since 1949—even, I think, in 1953. Now, I am afraid, the magic figure is going to elude us. So many factors are involved that we cannot weigh them all independently. Is this need as urgent as heretofore? Perhaps a sixth of the present stock of houses is new or relatively so. The average number of persons per unit may now at last be lower than before the war. Rent control is virtually gone and with it the ability of a considerable number of people to preempt quarters beyond their means in a free market. Is the demand for housing independent of the general course of business, or is the urge so strong that it will lag a general downturn? Our people aspire to home ownership and with respect to units for both rent and sale some contractors are reported to fear only a shortage of mortgage money that is now not likely to materialize. And yet, with recession, there could be a slowdown in migration from farms to cities and from cities to suburbs; the evident decline in the value of old houses may embarrass willing new home builders; the living space now available could accommodate more people without too uncomfortable a degree of contraction in cubic feet per person; vacancies seem finally to have risen above prewar levels. Finally, we have to revalue, under new and slightly less rosy conditions, the significance of the current high rates of family formation and births. The record denies that people will build and spend in direct ratio to the growth in population. Unfortunately, means also are necessary. And it is hard to foretell even the rate of family formation, which would presumably measure or heavily influence the demand for new quarters. The current potential of brides and grooms afforded us by the cautious couples of the early thirties is running down. For so many reasons today's young folks have been marrying young. But there is an offset. Old folks have been put in funds by social security, with more coming, and more of them than heretofore will be able to afford the dignity of their own little home. Net household formation will probably decline, but statistics are not going to tell us by how much.

I have to telescope all these considerations, and will do so tentatively by putting the number of starts in 1954 at 950,000 with the adjusted rate

declining mildly throughout. I say tentatively because I have not as yet allowed for any new prodding or pulling by government. This is still a lot of building, and the money costs should recede more slowly than the number of starts. That consolation should be assured by the growth in both size of families and home mechanization. Modernization and enlargement of existing houses should increase somewhat in lieu of new building; as to how much the experts aren't sure. The annual rate of expenditures for housing in second quarter 1954 should not fall below $10.5 billion, a loss of only $1.7 billion in comparison with second quarter 1953. But we haven't yet reckoned with the compassion of Congress if anything goes awry with housing, and a descent to a mere 950,000 starts will probably qualify. The Congress could subsidize, liberalize present supports for maintenance and modernization, lower FHA down payment requirements and extend maximum terms, further buttress the second mortgage market, or expand public housing, and the only reckless forecast is that it will do none of these things if construction slumps. I have been collecting proposals—from such sources as the President's Advisory Council on Housing, Presidential pronouncements, sample Congressional reaction, and industry spokesmen—and while the only clear prospect at the moment is for controversy, action in the end seems inevitable. In simple faith I am crediting Congress with the will and means to stimulate several hundred thousand extra starts and several hundred million dollars of additional private outlays. Requiring a figure, let us pare the fourth quarter 1954 loss—still comparing with the second quarter of 1953—to $1.2 billion.

Neither will other private construction do us much damage. Farm housing may slide off gently in the wake of the decline in farm income. Commercial building remains a little island of strength and should climb—perhaps in fourth quarter 1954, perhaps before—as much as 10 percent above second quarter 1953 when it was only beginning to struggle out of the priority eclipse suffered during the period of defense buildup. Industrial construction has been expected to tail off as defense plants were completed and this is the year for it to happen. Utilities and institutions should at least hold firm. Taken as a whole, the G.N.P. category of "construction other than housing" in second quarter 1954 may fail to gain over the big second quarter 1953 but any loss should be inconsequential—say half a billion.

Producers' Equipment

Here, in an organic sense, beats the heart of the system. The beats can fluctuate but not anything like as wildly as inventories. Better to say that in volatility among the big segments of the system they rank a poor but dangerous second, from which fact has poured torrents of cyclical theory and some equally dangerous corrective policies.

This big topic has been introduced with such gravity that I regret to report that the harbingers point down. I have been saying that for two years, accusing the segment of levitation for refusing so long to behave naturally and therefore in this case unstably. Now new orders for machinery have been declining for many months, production rates are down somewhat and backlogs considerably. New orders for the sometimes prophetic item of ball-bearings are running below shipments. Both electrical and petroleum refining equipment—important industries to be sure—are holding up, the one because of its central place in the present phase of our economic growth, the other because of a shift from expansion to quality improvement under the duress of completion. Industries that capacity-wise have been pushed ahead for defense purposes, however, will be tending to mark time a bit. Embraced here are all those numerous products benefiting from accelerated amortization, loans, and market guarantees, among which steel and aluminum are prominent.

Even so, I haven't whipped up much of a collapse. The strong elements are quite strong and no one can prove that decline in the others has not approached the self-correcting point, given the persistence of strength in the system generally which by now is becoming rather plain. And the principal causes for worry have been examined. Nor am I helped by the fact that new purchases of equipment kept creeping up to an all-time peak of $27.1 billion in third quarter 1953 after the rest of the economy turned down, and (I merely deduce from signs in the absence to date of any official determination) the fourth quarter rate was probably not much lower. However, I will argue that it would have been lower had producers not availed themselves of the last days of the excess profits tax to step up types of improvement that could be currently expensed before the year-end. But the latest Commerce-SEC survey of business intentions indicated a rate of investment in the present quarter that would nearly match that of second quarter 1953—nothing to brood over. Nevertheless some of the longer range soundings suggest a decline and I am bound by my record to resolve doubts in that direction. Also farm equipment belongs in this category and is not covered by the SEC-Commerce survey, and purchases thereof are likely to slip off further with farm income. A compromise is excusable. In the fourth quarter 1954, I will therefore put investment in equipment about $3.5 billion below the rate of second quarter 1953, which is only about 15 percent. In that way my previous judgment can be vindicated without doing much harm to the economy.

Net Foreign Investment

Useful argument here would be more concerned with the danger posed to world stability by too favorable a balance of trade than with the general effects on American business in 1954. The acute issue is the effect of changes in American business on international payments and the monetary reserves of other countries. Payments are now in precarious balance with foreign reserves of other countries. U. S. military and economic aid are all mixed up in the achievement and our climatic burst of prosperity in 1953 greatly helped their exports to us. There seems to be a unfortunate kind of asymmetry in our trade with the rest of the world. Changes in the tempo of American business are followed by greater than proportional changes in our imports, and our imports are far more important to their domestic activity and stability than to our own. A crack-the-whip effect is thus produced, with some damage and more alarm ensuing. But this worry is for the Randall Commission and I will gratefully leave it to them.

We have for a change been running an important surplus on private account, which has of course made the rest of the world feel very good while most Americans were not aware of it. With decline in our general activity there will probably be some decline in our imports. Europe's purchases from us, however, will probably not decline at the same rate because of their need for many of our goods to complete their programs of industrial reorientation in a split world. So the second quarter 1953 "unfavorable" balance should be wiped out if not tipped slightly the other way. For our national accounts in fourth quarter 1954 the swing-around means a gain of around $2.5 billion annual rate. Producing goods that we don't have to buy ourselves makes jobs and corresponding purchasing power for other goods and is therefore anti-recessionary.

Consumer Expenditures

This is the largest account of all and responds more sluggishly to change. Its amount is obviously determined by how much money people have left after taxes and what percentage of it they decide or are able to spend. So many pressures are working on both factors that it is difficult to sort them all out and weigh them properly.

Forces pressing income downward are (a) the net slippage in production which we have deduced up to a point and (b) the greater impact of that slippage on low and medium income groups who characteristically save smaller portions of their earnings. It hits the latter not because of any-

one's heartlessness but because a decline in business will normally express itself in disemployment of less well established and marginal wage earners and shouldn't at first affect very much higher salaried employees or dividends. Forces mitigating this downward pressure are (a) the accompanying decline in tax payments and (b) rise in transfer payments such as unemployment benefits, stepped-up rates of retirement by workers eligible for OASI benefits, and (c) increases in payments to veterans for which provision is made by existing law in such an eventuality. Forces tending to offset the decline directly are lower tax rates which will cut tax liabilities for more substantially than the recent increase in OASI rates will increase them.

The proportion of money saved by income recipients usually falls off in a recession as they either persuade themselves that the misfortune is temporary, or try to maintain standards of living to which they had become accustomed, or must of necessity spend previous savings. The savings ratio will fall off this time too, but not so substantially as usual because people will be paying off the installment and other debts contracted so cheerfully last year. This is a shorthand evaluation of the current worry over the high level of consumer debt. Liquidation or reduction of that debt to more tolerable levels is likely to take the form of a relatively high savings rate over the first few quarters of business decline which will mystify some observers when it happens. Eventually it should decline in accordance with tradition.

Nothing catastrophic comes out of this little complex of pressures and counter-pressures. In second quarter 1953 the annual rate of consumption expenditures reached $230.4 billion. It should average only a couple of billion less for the entire year of 1954 and hold up to around $225 billion or $226 billion in the low fourth quarter. Sales, depending on the willingness and ability of the public to spend, are not going to fall apart. The mix may alter somewhat, and the same general volume of trade won't mean the same volume for everybody. For example, services may gain a bit at the expense of goods and nondurables at the expense of durables.

Conclusion

All stories about the business tides have both quantitative and qualitative aspects—also of course both absolute and comparative ones. We can look at a few of them.

The quantitative outcome is simple enough. If you took any notes, you would find that all the pluses and minuses I have been collecting in my effort to fix the state of affairs in the last quarter of this year in relation to the second quarter 1953, the best we have known, would result in a decline of around $22 billion annual rate or from $372.4 billion to $350 billion. These are high and low points in time, as statistics go. The drop scales off considerably if (a) we compare whole years, and (b) we shift from dollars to physical volume. By the first test I doubt if even the dollar loss from the full year 1953 to the full year 1954 will exceed $10 billion and it might be less. In the big stakes for which a dynamic economy plays, this is miniscule—less than 3 percent. By the second test, adjustment for perhaps slightly lower prices would leave almost the same volume of total output in the two years. Another luminous statistic, I think, is that by the fourth quarter of last year we had already gone about two-fifths of the distance from peak to trough, assuming an orderly decline—which for present purposes I have—and most people have not yet felt any tremor.

Let us pull two or three oddments out of the pile of data. Inventories are revealed once again as the massive center of our problem. We seldom realize what a huge sum is needed for a function that merely implements each year's economic activity (and not all of that) and is not strictly speaking a part of it except for changes within itself. Last fall inventories were valued at almost $80 billion and economic activity in the third quarter came to about $92 billion. It smacks of perversity that a merely implementing factor is the most unstable of all and can pull the whole system with it—a domestic servant that periodically runs amok. This does not at all mean that business fluctations always stem from inventory change. It means merely what it says, that when they do move the earth shakes. In the present instance it has been surmised that the swing in inventories from peak to trough quarters will account for at least half the change in total activity between those periods and will have induced some unknown part of the remaining over-all decline.

Another feature is the economy's method of disposing of "excessively" high consumer credit outstanding. What was said above in effect was that ailing business in maybe the first half of the year would be denied the relief of a substantial fall in the rate of individual savings because consumers would be paying off debts contracted last year and our national accounts are so set up that debt retirement is posted as savings. This is also, however, a good subject for trick photography, economic photography, although one doesn't need accounts for it; nor economics either, homespun is good enough. Consumers will suffer a spell of thriftiness, not because of any sharp decline in income but because many had previously been living a little too far beyond their means. They could probably still get credit—and indeed they may, which would embarrass this forecast; the Administration and Federal Reserve Board are palpably anxious not to have a hard money label hung on them right now. But the forecast is that they won't. Conversely, one could say that people are going to save because they owe too much. It comes out the same; incomes will not be seriously affected but spending will decline somewhat.

Now for two qualitative observations:

(1) This is an optimistic forecast. It charges only a small economic price to mend the dislocations developed through years of artificial stimulation of our markets. There is always a cost to growth in the form of temporary imbalances and progressive obsolescence, and our monetary and fiscal policies have over a decade, for good and bad reasons—this is not a judgment—aggravated them. Indeed, as a people we have not yet solved the problem of how we want to pay the costs of growth. Should we keep resource use always high and unemployment always very low, through fiscal and monetary means? We probably could, at what at times would burst out into a high inflationary cost for most of our people. Thinking of the marginal two or three million unemployed our conscience may say yes and quasi-political groups will keep nagging us to do so. Thinking of the inequities of the inflationary method we may see it as a devil's pact and choose a course of underwriting merely high employment and of easing the costs to the disemployed through more liberal unemployment insurance. Some secular inflation would probably attend either course but the difference in degree is of course substantial. Conscience has to decide whether it is more humane to pay high for continuous and ideally high employment, or allow limited settling processes occasionally to weed out accumulated entrepreneurial wastes and refit the economy for its next rush of growth. A hundred qualifications keep this choice from being clean and it can hardly be posed at all without prejudicial language—as no doubt in the present case. If so, the prejudice is clearly more marked against those who look upon any interference by government in cyclical matters as a snare and would balance the budget through thick and thin.

The reason for all this theory is that we are already being pressed for action that would be equivalent or nearly so to a choice of the first alternative—prompt and vigorous remedial action by the government as the more human and perhaps even the more economic course. Most anything can be argued with some plausibility.

I said that this is an optimistic forecast in terms of what easily might have been as an aftermath of years of tension. I now add that it is optimistic absolutely. Many economists regard four to five percent unemployment of the labor force as

representing a high employment rate of activity. But our labor force has been unnaturally large, meaning that the high pay and often noncompetitive conditions associated with inflation have attracted many housewives, young folk, and older workers eligible for retirement benefits, who are marginal members of the labor force in the sense that a job is not a necessity to them and has to compete with other appealing uses for their time. More specifically the armed forces have been "employing" considerable numbers of young people who would have preferred going to school and who automatically became part of the labor force. Finally, there is evidence that during this same defense boom a larger number of workers than usual worked on more than one job at the same time. What we have had is an amount of unemployment averaging over several months last year less than two percent of this abnormally large labor force, or around 1.2 million. What we would have under the conditions envisaged for the closing months of this year would be from 3¾ to 4¼ million unemployed or probably something more than a million and a half over the number expected under conditions of theoretical full employment.

(2) This is a year of trial for our principal antidote for instability—so-called built-in flexibility. I have cited some of its elements—high corporation taxes on volatile income, progressive but less volatile individual tax payments, an unemployment insurance system under which contributions decline and benefits rise with declining business, farm price supports, a tendency for both individual and corporate savings to fall with income. These are the most important but there are quite a few others. It so happens that they will be supplemented this year by a couple of fortuitous but luckily timed developments such as tax reduction and, probably, the retirement of numerous workers who have for some time been eligible for OASI benefits. It's an exciting year for economists—and what businessman is not an economist where such matters are concerned?

Now personally, I would never want to be caught defending the absurdities of our present tax structure because it also happens to possess these stabilizing qualities in some degree. And this caveat would probably apply to some of the other "snubbers" in lesser degree, among them the farm policy that in its present form happens to have the whole population encased in its coils and that I predict will be the delight of cynically-minded historians. But that does not lessen my eagerness to see (a) whether the presence of such properties, good or bad in themselves, will really dampen down the recession we have coming to us—and their presence is one reason for my expectation of a mild one; (b) whether if the recession is mild we will credit these factors for our escape from something more serious; and (c) whether, if we do acknowledge their potency we can find the political acumen to substitute for the present provisions some that are a little less rake-helly, i.e., that serve more rationally their basic purposes of revenue, equity, business incentive, utilization of resources, and the moderation of gyrations in farm income.

Returning to the prosaic, I submit my final characterization of the year's business—which is important only for any help it may give you in analyzing the constituent elements out of your own experience and knowledge rather than for my own conclusions. Down irregularly through the final quarter; averaging not far below last year's business dollar-wise and nearly equaling it in volume; nevertheless idling some resources in men and machines because of secular growth in both; capable of turning up during the first half of 1955; sustained throughout by the new-fangled cushions of built-in flexibility. What I have asked you to do in effect is to take your courage in your hands and prepare once more to descend to the awful depths of somewhere between 1952 and 1953.

1954 Canned Food Procurement Plans and Requirements for the Armed Forces

By Brig. Gen. N. E. Waldron, Commanding General, Hq, QM Market Center System

It is an honor and distinct pleasure for me to appear before you this afternoon as a representative of the Quartermaster General and as Commanding General of the Quartermaster Market Center System, to speak to you briefly concerning the food purchasing activities of the Quartermaster Corps. My purpose will be to attempt to review for you the activities of the Quartermaster Corps in the procurement and supply of foodstuffs to the military forces since the close of World War II.

In the early part of 1951, after the outbreak of the Korean action, negotiation again became necessary for canned fruit and vegetable pack items. Before touching upon the more current aspects of this subject, however, I would like to review briefly the history of the food procurement for the military forces since the close of World War II. Following World War II and up to 1953, The Quartermaster General procured subsistence under two separate systems—one for perishables and another for nonperishables. The Market Center System with Headquarters at Chicago was the agency used for procurement of perishables and has proved to be a highly successful decentralized method of procurement. Nonperishables were centrally procured by The Quartermaster General using principally the Oakland and New York Procurement Agencies and the Chicago Quartermaster Depot to effect this procurement. In 1947, the Munitions Board assigned single service purchase responsibility to the Quartermaster Corps for the procurement of all subsistence for the armed forces. This was one of the earliest steps taken toward unification of the armed forces and in light of subsequent developments one which has proved highly successful and satisfactory to the Department of Defense.

In the first years of this postwar period (1946-47) the purchase of nonperishable items by the three Quartermaster central purchasing offices located at New York, Chicago and Oakland continued under negotiation authority which had been authorized during World War II. In 1948, however, the authority for negotiation under the provisions of the Emergency Act was withdrawn and these supplies were obtained by formal advertising, during the 1948 and 1949 seasons. During these years the provisions of the Walsh-Healey Act, with which I am sure you are all familiar, were applicable and as a result it was necessary to purchase large quantities of commercial can sizes in order to obtain the quantities desired.

After the outbreak of the Korean action, negotiation authority was again granted for canned fruit and vegetable seasonal pack items but without concurrent exemption from the provisions of the Walsh-Healey Act. While this authority did not permit any prepack contracting for these items, it did permit flexibility in obtaining supplies necessary to meet that emergency situation, although not without considerable difficulty by requiring us to accept whatever shelf stock and can sizes were available.

As you know, the Walsh-Healey Public Contracts Act is, with certain exceptions, applicable to all federal contracts in excess of $10,000. Contracts for canned fruits and vegetables do not fall within any of the statutory exemptions and, therefore, are subject to the Act in the absence of an administrative exception which can be granted by the Secretary of Labor. On the other hand, processors of canned fruits and vegetables enjoy a seasonal exemption from certain of the provisions of the Fair Labor Standards Act.

In the absence of an exception from the provisions of the Walsh-Healey Act it is not possible for the Quartermaster Corps to effect procurement of its requirements for canned fruits and

vegetables in advance of their canning since historically canners have declined for very good reasons to assume the burden of compliance with the Walsh-Healey Act during the period of their seasonal exemption from the overtime provisions of the Fair Labor Standards Act. As a consequence of this situation it has been necessary for the Quartermaster Corps to withhold the solicitation of bids or quotations until the pack of an item is nearing completion in the absence of an exception granted by the Secretary of Labor to the provisions of the Walsh-Healey Act. In the past this has resulted in the purchase of small can sizes rather than the institutional or No. 10 can size and has necessitated in many cases overpacking for export. This is costly and constitutes an unnecessary expenditure of government funds in a time when every defense dollar must be utilized in the most economical manner possible. For this reason we intend to continue to request exemptions from this Act.

Subsequently in 1951, 1952 and 1953, the purchase of the canned fruit and vegetable items has been accomplished under negotiation authority with the use of letter contracts and set-aside authority. Concurrently with each of these programs, exemptions from the Walsh-Healey Act were obtained. On other nonperishable food items formal purchase procedures were used throughout this period. This set-aside procedure for purchasing canned fruit and vegetable supplies for the armed forces under the emergency conditions which existed with the outbreak of the Korean conflict has proven most effective in obtaining the quantities and package sizes desired. Its application and use makes exception from the Walsh-Healey Act mandatory.

The latest major development in the procurement of subsistence occurred in March of 1953, when the mission of purchasing all nonperishables was added to the Market Center System. To accomplish this, the subsistence purchasing functions of the Chicago Quartermaster Depot, New York and Oakland Quartermaster Procurement Agencies, were transferred to the Quartermaster Market Center System. (Subsequently, in August of last year, the Oakland Procurement Agency was abolished.)

Since this integration of perishable and nonperishable purchase activities, the primary link with the food resources of the nation has been the Quartermaster Market Center System, which is now charged with the mission of purchasing food for all of the military services. The magnitude of this responsibility can best be visualized in terms of annual food costs to the armed forces, which amounts to well over $1 billion. This represents a sizable portion of our Defense budget and establishes the Market Center System, I am informed, as the largest single customer of the food industry.

The Quartermaster Market Center System, as it is now organized to accomplish this mission, consists of a Headquarters located in Chicago and nine field Market Centers located in New York, Richmond, Columbia, Fort Worth, New Orleans, Denver, Seattle, Oakland, and Los Angeles. In addition, field buying offices, currently 18 in number, are established as required to accomplish field purchasing under the direction of the Market Centers. These offices are opened and closed seasonally or maintained on a permanent basis in accordance with the dictates of the purchasing mission and the economical use of personnel and funds. It was for these reasons that all but two of the former canned fruit

Brig. Gen. N. E. WALDRON

and vegetable field buying offices will be closed as of January 31 this year. If and when they are again required for the 1954 and subsequent programs, they will be reopened at locations as needed. The total personnel complement of the System consists of approximately 110 military and 1,330 civilian employees.

In addition to administering the System and prescribing uniform policies and procedures for all Market Centers, the Chicago Headquarters maintains close nationwide daily control over major purchases. Extensive use is made of teletype and telephone contact with the field Market Centers to assure that up-to-the-minute information on market conditions in all parts of the country is considered in making contract awards.

Since its inception, the Quartermaster Market Center System has used a streamlined negotiation purchase procedure for perishables which was originally patterned after that used by private industry. This was authorized by law under the Armed Services Procurement Act of 1947, but applies to perishable subsistence only. Under this system, notices of intent to purchase, which are informal invitations to bid, hereafter referred to as NIP's, are sent to the trade nationwide, stating the items and quantities that we require, the destination and time of closing for offers. The vendor telephones his offer usually within two hours before closing, to the nearest Market Center. All details concerning these offers are immediately recorded on a summary sheet and compared to determine which offer is the low responsive offer.

If carload or truckload quantities are involved, the low offers from each Market Center are teletyped to my Headquarters where the low offer on a nationwide basis is determined and instructions are issued as to which Market Center is to make award and administer the contract.

This procedure is modified in the case of fresh fruits and vegetables where skilled buyers personally visit the growing area for carload requirements, or the terminal market for less than carload quantities. The buyer visits all vendors who have the required items on hand, examines them to determine which is the best value, in quality as well as price, and subject to the approval of the contracting officer, makes the selection. Here again all offers and facts pertaining to the transaction are carefully recorded.

Thus, it may be seen that the Market Center procedures developed for perishables are entirely different from those used under formal advertising and set-aside yet they not only maintain the desirable features of open competition and complete records found in formal advertising, but they are also sufficiently flexible to permit the application of business experience and judgment to rapidly changing market conditions.

Also, the locations of the Headquarters and 9 Market Centers and the 18 subordinate field buying offices within the geographical areas of production and potential suppliers of food items permits a close working relationship with vendors and contractors which was not possible under the previous organization for canned food purchasing, where all contracts were prepared and administered in only three widely separated central purchasing offices.

As previously indicated, nonperishable subsistence since World War II has been procured by formal advertising with certain exceptions made under the emergency provisions of the Armed Services Procurement Act of 1947, and applying to the annual pack of canned fruits and vegetables. Brand name resale items are procured by negotiation under specific authority of our procurement law.

With the integration of the two purchasing activities, nonperishable

and perishable, it was soon evident that full advantage of economies and organizational and operational efficiencies of the single organization could not fully accrue as long as two widely different methods of purchase were in use. For example, while boneless beef could be purchased under a fast moving, flexible system of buying, it was necessary to buy canned beef under the slower, and less flexible, method of formal advertising despite the fact that market conditions under which beef if purchased, whether canned or frozen, are similar. Therefore, with a view to unifying these procedures, the Market Center System, in September, 1953, requested negotiation authority for all nonperishable items. This authority was granted in November of last year under the "national emergency" authority of our procurement statute and has been employed on all nonperishable items since that date.

In applying this authority to the purchasing of canned food items other than seasonal canned fruit and vegetables, the general NIP procedure which I have outlined for the purchase of perishables has been used and maximum decentralization of purchase action to Market Centers nearest the sources of supply has been accomplished without the loss of full nationwide competition in bidding for this business.

I believe that what I have just told you brings us up to date in a general way on our past food supply programs. I am sure, however, that any discussion of such a subject would be most incomplete as far as you are concerned if I did not present at least a glance as to what our future requirements may be and especially the coming seasonal program for 1954. Our estimated requirements from the 1954 packs, in thousands of pounds, are as follows:

Canned Fruit

Apples	14,988
Apple sauce	9,634
Apricots	9,921
Berries	2,546
Cherries, sour	2,939
Cherries, sweet	1,849
Figs	3,456
Fruit cocktail	16,508
Juice, pineapple	18,902
Peaches	22,514
Pears	12,661
Pineapple	13,523
Plums	5,614
Total	133,655

Canned Vegetables

Asparagus	3,906
Beans, lima	10,186
Beans, string, snap	24,479
Beets	8,164
Carrots	8,173
Catsup, tomato	12,918
Corn	13,024
Juice, tomato	37,973
Peas, green	25,392
Potatoes, sweet	19,887
Pumpkin	1,849
Puree, tomato	4,710
Spinach	3,878
Tomatoes	52,513
Tomato paste	6,226
Total	233,278

Estimated QMC Requirements from the 1954 Pack

Procurement plans and tentative requirements of canned fruits and vegetables from the 1954 pack to meet the needs of the armed forces were announced by the Department of Defense on January 24, simultaneous with the appearance of Brig. Gen. N. E. Waldron at one of the Convention sessions.

The official announcement stated, in part:

"With the cessation of hostilities in Korea, it is considered that the set-aside and letter contract procedures followed in 1951, 1952 and 1953 are no longer necessary. Accordingly, plans for 1954 contemplate procurement by competitive negotiation. Under this procedure, all suppliers will now be free to offer whatever percentage of military requirements they wish to sell as contrasted with the set-aside and letter contract procedures which limited canners to sale of a set quota of their production. The 1954 plan does not envisage the use of the letter contract procedure.

"Procurement will be effected by the various Market Center offices of the Quartermaster Market Center System, the Headquarters of which is located at 226 West Jackson Boulevard, Chicago 6, Illinois. Detailed information may be obtained either from the Headquarters or the Market Center office nearest to the supplier.

"Prepared by the Army Quartermaster Corps, the estimated requirements are subject to modification and are announced to assist industry in planning 1954 production."

The estimated requirements are as follows, in pounds as announced by the Defense Department and in standard cases as converted by N.C.A. (30 pounds per case for vegetables and 45 pounds per case for fruits):

Canned Vegetables

Item	Total Pounds	Thousands of 24/2's
Asparagus	3,906,000	130
Beans, lima	10,186,000	340
Beans, string, snap	24,479,000	816
Beets	8,164,000	272
Carrots	8,173,000	272
Catsup, tomato	12,918,000	431
Corn	13,024,000	434
Juice, tomato	37,973,000	1,266
Peas, green	25,392,000	846
Potatoes, sweet	19,887,000	663
Pumpkin	1,849,000	62
Puree, tomato	4,710,000	157
Spinach	3,878,000	129
Tomatoes	52,513,000	1,750
Tomato paste	6,226,000	208
Total	233,278,000	7,776

Canned Fruits

Item	Total Pounds	Thousands of 24/2½'s
Apples	14,988,000	333
Applesauce	9,634,000	214
Apricots	9,921,000	220
Berries	2,546,000	57
Cherries, sour	2,939,000	65
Cherries, sweet	1,849,000	41
Figs	3,456,000	77
Fruit cocktail	16,508,000	367
Juice, pineapple	18,902,000	[a]630
Peaches	22,514,000	500
Pears	12,661,000	281
Pineapple	13,523,000	301
Plums	5,614,000	80
Total	133,055,000	[b]2,536

[a] Basis 24/2's. [b] Total does not include 630,000 24/2's of pineapple juice.

For the canned items other than seasonal canned fruits and vegetables, we plan to continue the procedure described to you previously. In connection with the development of plans for procurement of canned fruits and vegetables from the 1954 packs, a meeting was held in Washington on December 3, 1953, with the Industry Advisory Committee on Fruit and Vegetable Canning. At the time of this meeting, the Quartermaster Corps was not certain as to the need for a continuation of the mandatory set-aside order by the Department of Agriculture. Accordingly, this question was placed on the agenda for discussion. After full consideration of the Committee's recommendations and further study, we have concluded that the program followed in obtaining canned fruit and vegetable supplies during the past emergency period of 1951, 1952 and 1953 is no longer necessary, since the emergency condition which prompted it no longer exists, and that to continue such a program is costly and not in the best interest of the government nor to you as a taxpayer. For this reason we do not intend to ask for set-aside authority and instead will employ the NIP system or procedure already outlined but which I shall here again restate in a general way as it will apply to canned fruit and vegetable purchases.

Requirements, as received by my Chicago Headquarters from The Quartermaster General, will be evaluated for each individual item and suballocations made to the Market Centers of the System on the basis of estimated potential production in their respective areas. Individual Market Centers will publish NIP's covering quantities assigned to them, with each Market Center mailing its NIP's to potential suppliers listed on national mailing list, thus insuring complete national coverage and maximum competition. Mailing of NIP's will be timed so as to permit their receipt by vendors in advance of the packing season. This will allow the vendor

adequate time to arrive at a factual offer. NIP closings will be timed so as to permit firm price quotations. Closings will also be timed so as to allow appropriate lead time to permit vendor to obtain packing supplies after awards have been determined. Quotations wil be submitted by prospective suppliers to the Market Center issuing the NIP, and after evaluation of all bids submitted, awards will be made by that Market Center to any low bidder located in its area. Awards made to low bidders located in other Market Center areas will be made by those respective Market Centers who will also prepare, issue, and administer the contracts pertinent thereto.

We believe there are many advantages which will accrue in the adoption of this method, the most important of which are:

Full nationwide competitive bidding for government business will result. This is always of prime importance in obtaining government supplies at the lowest item cost to the taxpayer and cannot exist under a set-aside program and use of letter contracts. We believe this close proximity to you as individual suppliers will substantially improve the already good government-vendor relationship.

Considerable operational economy can be effected through the elimination of some field buying offices.

Losses on claims will be reduced and minimized. Failure to accept quantities packed for the government under letter contracts because of disagreement on price results in serious losses to the government from claims arising out of special packing costs.

It is recognized that exemption from the provisions of the Walsh-Healey Act is a prerequisite to the application of this type of purchase program. Request for such exemption has, therefore, been made to the Secretary of Labor and it is expected that a favorable decision will be forthcoming in the near future.

In closing, I want to take this opportunity on behalf of The Quartermaster General and the Market Center System to express our deep appreciation for the outstanding spirit of cooperation, support and assistance which you of the canned food industry have given us in the past and to solicit a continuance of this spirit throughout the coming year. We on our part want to work and to be as closely associated with you, individually and collectively, as is possible. It has long been our policy to maintain this close relationship and I believe that the present Market Center System organization lends itself to enhancing and improving that relationship. I sincerely hope that you will take advantage of the proximity of our Market Center and Field Buying Offices in your area to become better acquainted with us and I assure you that our field representatives will be doing so with you.

The Coming Second Revolution in Food Marketing

By E. B. Weiss,
Director of Merchandising,
Grey Advertising Agency, Inc.

Figures compiled by the Super Market Institute and by other sources leave no doubt that the net profit percentage of the food super simply refuses to move up in a convincing way.

This becomes particularly worrisome when we understand that the current net profit figure of the food supers includes a whale of a lot of new nonfood lines on which these outlets are taking markups of 30 percent, and 40 percent, and more.

On food, too many food supers are showing either a microscopic net—or an actual loss. Some food supers are able to show a net profit only by constantly opening new store units, and there is some reason to believe that the race to open new units, particularly giant one-stop units, may be touching a danger mark.

Now it seems to me that when any retailer concludes that he must place increasing dependence on new merchandise categories for a livable net profit, that that does not bode too well for his traditional lines, in this case food. It doesn't bode well for that retailer. Neither does it bode well for his suppliers, such as the canning industry.

After all, it is only human nature to give extra attention to what is new. And when that something new apparently is the major source of net profit, then it surely will gobble up a store's inventory dollar, payroll dollar, promotional dollar, out of all proportion to what it merits. That is exactly what nonfood in the food store is getting.

Already, at least 20 percent of food supers are doing over 25 percent of their total volume in nonfoods. At the rate these outlets are turning to nonfoods, entirely too many food supers will soon be crediting from 40 to 50 percent of their total dollar gross to nonfoods.

It is significant and disturbing to note that a substantial percentage of the new food store units opened in the large shopping centers did not reach planned figures in the first year of operation.

Yet the food super tends to conclude, on the basis of superficial figures, that from 50 to 75 percent of its total net profit comes from nonfood! The bald fact is that many, if not most, of the food super units that have gone overboard on new nonfoods show a poorer-than-average net profit.

But because the food super is in love with nonfood, I find that the food super is tending to do the following:

(1) The food super is squeezing floor space formerly assigned to food —in order to make space for new nonfoods, or for expanded space for established nonfoods. Inasmuch as unseen is unsold under self-service, this squeezing of food hurts the canning industry. Also, it is this space squeezing that contributes to out-of-stock and under-stock conditions, which hurt volume fearfully. And new food items have a very tough job getting in because there just isn't space.

(2) The food super is giving nonfoods strategic floor locations—locations formerly given to food almost automatically.

(3) It is devoting its best brains, best energies, and "best" finances to nonfoods.

Some of the results of these actions and attitudes are that:

(1) The food super is out-of-stock on fast-moving food items to a degree that is truly dismaying.

(2) The horrible blockade at the check-out gate is made still more horrible by the time required in checking out nonfoods.

(3) The food super is doing a poorer and poorer job of selling the full food requirements of each customer to the traffic in the store.

Let's spend a bit of time with that third point. It is of keen interest and considerable importance. I said that the food super is doing a poorer and poorer job of selling the food requirements of each customer to the traffic in the store. I have some startling statistics on this point.

These accurate figures, compiled by an unimpeachable source, show that:

(1) One large food chain gets only $7.31 weekly out of a total food expenditure of $19.16 by its "regular" customers.

(2) Another large food chain shows comparable figures of $6.08 and $18.76.

Those figures were further broken down, for one of those two large food chains, into sales to customers according to degrees of loyalty. These figures showed that:

(1) From its most loyal top 25 percent, this food chain got $14.14 out of a total weekly food expenditure of $23.39.

(2) From the next most loyal quartile, the figures were $6.52 and $17.43.

(3) From the third quartile, $2.99 and $16.23.

(4) From the least loyal quartile, 84 cents out of a weekly expenditure of $18.10.

Clearly, the food chains are not doing the food volume that could be done if they concentrated on selling food to the shoppers who are right in their stores. The food supers are not staying in their own back yards; instead they are meandering dizzily over the entire merchandise map. And the reason for that is a desperate

search for net profit that is being conducted in the wrong place. Food can restore the profit percentage of the food super if it will look to new techniques for merchandising food instead of looking at nonfood.

A very significant indication that all may not be too well with respect to the nonfood activities of many food supers is to be found from statistics recently released by the Super Market Institute. I quote: "Sales of new super market units are lower than expected in five out of six highway locations in the majority of new supers in large new shopping centers. Sales are more than 10 percent below estimate in almost half, or 43 percent of the new supers in large new shopping centers and in 1/3, or 33 percent, of the new highway locations."

I am sure it is hardly necessary to point out that it is in these highway locations and in these large new shopping centers that the food super has really outdone itself in the addition of nonfood lines. I am sure also that I need hardly point out that with the enormous costs involved in these particular locations, failure to meet plant figures by 25 percent is almost a guarantee of a loss in the operation. I think sales are more than 10 percent below estimate in from one-third to almost one-half of the food super units in these locations, and therefore, there can be little reason to doubt that these giant one-stop food super units are proving quite unsuccessful in employing nonfoods as a profit producer.

I believe that the food super must develop revolutionary new food-selling techniques—techniques as revolutionary as self-service was years ago—new techniques that will enable the food retailer to earn a sound profit percentage on food. This is vital, because if the food retailer is not smart enough to earn a profit on food—which is what he knows best—he is not likely to earn a net profit on nonfoods, about which he knows too little!

And let's remember that most of the net profit made by the food super on nonfood was made when competition in these categories was not too keen. Those days are over. The competition in nonfood is becoming bitter, and those who have merchandised nonfoods for years can merchandise rings around most food supers in a competitive era.

To repeat, I say that the food super must learn all over again how to earn a livable net profit on food. And I say that it will learn this lesson only if it will apply itself to revolutionary new techniques for merchandising food.

Those revolutionary new techniques, which I propose discussing in some detail here today, will some day be called the "second retail revolution." The food retailer sparked the first retail revolution. I think necessity will compel him to spark the second retail revolution.

The first retail revolution included the growth of our great chains, the decentralization of retailing, and the self-service of food. It also involved such trends as night hours, impulse buying, the emergence of the male as a shopper, shopping centers, and one-stop outlets.

The second retail revolution will take these forms:

(1) The mechanization of many floor functions in food outlets. This will include brilliant new concepts of the vending machine. It will mark the advent of the age of automatic retailing and will particularly involve canned foods.

(2) The application of electronic devices to certain food-super functions —at the check-out gate, for example.

(3) The application of mechanical and electronic developments to moving merchandise into and out of retail food warehouses; from back rooms to store shelves; from store shelves to the parking lot.

(4) A trend back toward small food stores selling only those fast-moving food items that can be dispensed through mechanical and electronic techniques. This would apply particularly to canned foods and would be truly revolutionary. What's more, it has already begun.

(5) The development of new concepts of store location in response to the new shopping habits encouraged by the new robot retailing techniques.

(6) The use of electronics in the office work of retailing.

(7) The still further growth of our giant retail organizations.

It will also involve the development of the precooked, prepacked complete meal—a truly revolutionary development that I think lies immediately ahead and which may lead to as many radical changes in canned foods as will be induced by new scientific techniques for canning that are now in the laboratory stage. How, for example, is canned food to be identified when it winds up as part of a precooked, prepacked complete meal?

Let's take a quick glance at some of the recent fascinating developments in automatic retailing.

Union News Company is testing a multitude of products in a huge battery of automatic vendors in Newark's Pennsylvania Railroad station. These are compartment vendors—not slot vendors. In Europe, the compartment vendor has developed fast. I think it is due to develop fast in our country, too.

Another food super has a public-address system with box-type microphones that permit shoppers in any part of this huge store to ask about the location of any product. Where will this idea lead?

A shopping center plans the use of closed-circuit television cameras that will allow children to be seen by parents from all stores in the center while the mother is shopping and the child is playing in a controlled playground. How about seeing merchandise through the same technique?

Will closed-circuit television some day be applied to retailing? With the closed-circuit technique it is possible for a factory superintendent, for example, to "see" just about every part of the plant while remaining at a single station. Some remarkable developments in simplifying closed-circuit equipment have been announced in recent months. Maybe some day the shopper will be able, through closed circuit television, to "see" every item in the store from a seat and, through some automatic means, record her selections.

A Pittsburgh food super has installed, as an integral part of a window, an automatic vendor dispensing doughnuts. It accounts for 25 percent of total doughnut sales by that store and 20 percent of these sales come after the store is closed. I emphasize those two points because I believe that automatic vendors will take the place of many windows and that they will roll up big sales both when the store is opened and when it is closed!

A number of stores are now selling cigarettes through window-type automatic vendors. I think the store window is destined to give way to batteries of machines that will sell when the store itself is closed, as well as when the store is open.

There is talk about an automatic newsstand—and certainly that doesn't strain the imagination.

Hot dogs are to be vended by a machine that will heat and deliver one in 20 seconds.

The push-button vending of meals is on a quick rise. Some manufacturers have such installations in their plant restaurants that run into hundreds of thousands of dollars; railroads are testing the plan in their dining cars, etc. I think the push-button vending of complete prepacked meals in the food super is on the way.

The soda jerk—sad to relate!—may become a museum relic. The automatic dispensing of sodas is on the way.

Childs is planning to deliver precooked foods to a series of small luncheonettes; there the food will be electronically reheated. From this concept it isn't very far to true automatic vending of meals in restaurants. And, as I've already indicated, that will lead to the automatic vending of complete prepacked meals in the food super.

Self-answering phones are beginning to get quite a play in retailing. Bamberger's, Newark department store, has five of the devices to handle its phone-order overflow. Perhaps the device some day will change completely the present telephone retail

order-board technique. Several druggists are using it to take down orders and prescriptions when the store is closed or the pharmacist is busy! Maybe this development will bring back the telephone ordering of food.

The automatic vending of milk has had results ranging from fine to poor. One operator merchandises half-gallon milk containers through seven units located near gas stations; this points up one of my convictions that food will soon be sold in new locations. Over 100 of these machines are vending milk in New York City apartment houses. Will some canned foods ultimately be sold in large apartment houses in the same way?

National Rejectors, Inc., has developed a device that will vend up to 450 items mechanically. The machine also adds up the purchases, the amount of money fed into it, and makes change. It cost $1,000,000 to develop and it is awaiting exploitation. If I were in the canning industry, I would watch this carefully.

I would not want to create the impression that, when I refer to mechanical retailing, I am thinking exclusively, or even primarily in terms of vending machine principles. For example, Clarence Saunders, who died recently, to my mind was really the father of the self-service concept, and might have come up with a brilliant new concept of mechanized retailing. Keedoozle was an ill-fated attempt to apply mechanical principles to food retailing. His more recent concept, the Foodlectric store, which appears to have solved some of the unresolved weaknesses of Keedoozle, may prove more successful.

It really is becoming less and less necessary, in certain food categories, for the shopper actually to have in her hand or in a basket, as she reaches the check-out point, the items she has bought. This is particularly true of some canned items that are strongly advertised. It is only tradition and habit that blindly assumes that the shopper must actually carry the merchandise to the check-out point.

Ultimately, food stores will crop up in which the merchandise will simply be available for inspection. All items will be numbered and the shopper will be given perhaps a numbered card instead of a shopping basket. When the consumer selects an article, the card will be punched. The punched card will be delivered at the check-out point and perhaps run through an electric calculator and automatically checked. The merchandise purchased as indicated on the punched card will be ready at the check-out point, or at a station in the parking lot. This, of course, is in part what Saunders of Keedoozle and Foodlectric had in mind.

An electronic conversion unit has been developed that records net weight readings directly from any dial scale. It then feeds this information into an electronic calculator which proceeds to record, itemize, total and subtotal weights, as well as to store, subtract, multiply or extend information as desired.

Perhaps my imagination has gone hog-wild, but knowing what electronic devices are doing in industry—knowing, for example, how Bell Telephone has made the whole switching, recording, and billing operation almost completely electronic with the whole system actuated by the dial on your telephone—I choose to believe that a machine capable of reading weights from a dial scale and which then proceeds to itemize and total, might conceivably perform the duplicates of those functions as an elec-

E. B. WEISS

tronic version of the check-out counter or cash-wrap desk.

I can picture the following steps in a checkout facility of the future:

(1) A uniform system of marking prices on packages so that the electronic device can pick up this information.

(2) The shopper, or an attendant, puts the purchases on a moving conveyor, that parades the merchandise in front of the "electric eye."

(3) The electronic device then itemizes, totals, etc.

(4) The attendant makes change.

(5) The merchandise continues on the conveyor to a point where, with modern methods instead of present-day hand techniques, it is suitably wrapped.

(6) The total purchase then continues on the conveyor out to a station or stations in the parking lot where it is picked up by the shopper.

Of course, there are many possible gradations between that type of installation and the present "hand" technique. It may be, for instance, that mechanical contrivances will precede the electronic.

An electronics engineer told me the other day that he could see no serious technical problem in an "electric eye" installation that would flash a signal to the retail stockroom immediately when the stock of any item on a vertically-piled shelf had dropped below a predetermined point! What might that do to alleviate the costly out-of-stock, short-stock problem?

I see no reason why the market may not be provided, some day, with a mechanical device that will be able to sell packs of 3, 6, or 12 canned items and accept the required coins and make the required change. And I might add that, since electronic devices can "read" subtle chemical changes in a chemical plant process, it should not be beyond the ability of the electronic sciences ultimately to provide a device that will "read" bills and thus wipe out the existing restriction that limits the vending machine concept to coins.

Here and there I see still other signs of efforts to apply mechanics to the floor of the retail store. A Food Town super market in Rockville, Md., features seven electric turntables for food display purposes. Each table holds 1,000 pounds of food items. They revolve at the rate of one revolution per minute, which, it is hoped, will permit shoppers to help themselves to whatever foods are displayed on the revolving table.

Will this plan prove successful? I don't know. But it spotlights the trend of aggressive retail thinking.

Then there is the problem—the costly problem—of getting merchandise on to the store shelf. In food stores, it has been estimated that some 20 to 25 percent of the gross margin is consumed in just this one phase of the retailing function.

The famous real estate operator, William Zeckendorf, president of Webb & Knapp, recently declared that "robot devices could store cars automatically and recapture them much like an IBM machine files cards." His company has invested over $500,000 to date in studying such devices. Surely if cars can be stored and recaptured like IBM machine file cards, the same can be done with at least some foods that are now moved by hand in retail stores.

A recently opened food warehouse has electronically-controlled tow trucks. They are operated through remote control by two men—in a 77,000-square foot warehouse. These men can stop, start and steer the electric trucks from 200 feet away by electronic signals. Each electric truck is capable of hauling up to five cargo trailers. That, I believe, is a sign of what lies ahead!

Every check ever made into the out-of-stock situation in most food supers has revealed a condition bordering on

chaos. It is especially damaging to the canned foods industry.

Not one of our automobile manufacturers could produce a car at present prices if their systems of inventory control were as obsolete, as inefficient, and as obviously suffering from every kind of neglect as is true of the inventory control of too many food supers.

Yet I have had the experience, in talking to the top executives of one large chain about the out-of-stock problem, of being compelled to listen to them remark that "We can lick this problem if only we can make our store managers and personnel more alert."

How naive can one be?

All the alertness in the world isn't going to make much of a dent in correcting the food super's out-of-stock and under-stock problem—so long as all of the other factors remain in a medieval state. The bald fact is that store personnel constitute the last link in this inventory problem.

Indeed, the starting aim of a new program for correcting out-of-stock conditions must be to place less and less reliance on store personnel in particular—and less and less reliance on the human factor as a whole.

Right here is one of the great weaknesses in food store inventory control techniques: They are still built too much around the human element, instead of being built around electronics.

There is no question that the remarkable development of the electronic sciences, and particularly those fabulous developments that revolve around the electronic computer will profoundly revolutionize innumerable food super office functions. Inventory control is an office function.

I referred before to closed-circuit TV. RCA-Victor Division, of the Radio Corporation of America, is pushing its new low-price, closed-circuit television system for retail store usage. Its potentials include branch store hook-ups with the home office; verifying signatures of customers for various purposes; transmitting promotional activities from headquarters or from one store unit to additional stores; as an anti-shoplifter device; sales training; safety control in marking, receiving and shipping operations. In Cleveland, the Retail Merchants Board staged a demonstration showing how closed-circuit TV could spot shoplifters.

Do these potential applications strike you as being just too visionary? Then pause long enough to learn that a New York bank is using closed-circuit TV to operate a branch unit. This branch unit, through electronic communication, really functions as a "satellite" of the main unit. Will that idea be used some day by the food super?

Several authorities have declared that the advent of closed-circuit TV makes possible the ordering of foodstuffs from a remote food center. Indeed, I understand that meat is being sold in this manner right now by one food super.

The practicality of this last concept seems verified by the fact that a company has been formed, called Selevision, Inc., which makes it possible for retail and wholesale food buyers from 10 different cities to enter bids at a perishable food auction. While this plan, which is entirely experimental, employs teletype, not closed-circuit TV, the next step may be to make the offered merchandise visible to the prospective buyers. With color TV on the way, this development may not be at all remote. From the technical end, there is nothing to prevent offering a service of this kind on a nation-wide basis, and applying it to other foods and to nonfoods as well.

Let's turn for a moment to a simple mechanical improvement: A food super installed a mechanical box lift at the check-out; it automatically maintains a stack of empty cardboard boxes for packing customers' purchases. Another food super now puts stack displays on wheels; an all-metal dolly with ball-bearing casters makes possible mobile stack displays.

With many types of chain stores doing prepackaging, it is interesting to note how rapidly labor-saving devices are coming on the market to simplify this job. An automatic bag-making machine is capable of turning out 3,500 tailor-made cellophane bags per hour. A ticket marking machine prints and stacks perforated labels from large rolls. A bag-sealing machine makes an instant heat-sealing closure. It also affixes the price ticket to the bag; this is done by vacuum.

Kroger uses a label-printing machine for prepacked meats that prints weight, price per pound, unit value, grade, product identity, date, code. It also provides automatic count for packaging control, and permits quick figuring of profit margins.

National Tea has installed a label-printing machine that has an attached scale. The operator sets the price per pound on the scale, then transfers the computed value to a keyboard. A printer then prints weight, price per pound, unit value.

An automatic device for vending frozen orange juice has been announced. This is quite a revolutionary development.

Recently, a Standard Brands executive asserted that equipment manufacturers are actually thinking in terms of a "conveyor" store. The shopper sits before a revolving conveyor which brings to her every item in the store. She turns a key to make her selection. A packer collects her selected items and all purchases are ready and totalled for her when she leaves her seat! I have predicted stores like "carousels." This may be it.

Late in October it was announced that the United States Bureau of Standards, working with several business machine firms, had perfected an electronic machine capable of reading printed letters and figures. Almost simultaneously, Addressograph-Multigraph announced a machine that can scan and reproduce up to four lines of printing without any intermediate steps of metal cards or tags. And it can process between 7,000 to 10,000 cards per hour. An address printed on a standard business machine card can be copied off onto a variety of tapes, labels, business forms, mailing lists, or inventory records.

The same company also expects to have a larger version of this machine. It will be able to decide which card to reproduce, which to pass by, and then it will put all cards back in their original order! It can also monitor a battery of "slave" electronic printers. Thus, a selector on one floor can run a mailing machine on another floor, and city-to-city operation is not far away. How will this be used in food retailing?

You've probably heard about the remarkable electronic magnetic memory drum developed for John Plain & Company, the large wholesale mail-order house. It's called the "Distributon." It cut labor requirements for inventory record-keeping from more than 40 girls to 10. It makes available immediately the following data: Total orders for any catalog item, correct to the instant; printed record of transactions for any catalog item or items; printed record of the complete inventory in less than three hours; it sorts figures into 39,000 classifications, adds as it sorts, and registers all totals for instant visibility; it makes possible balanced inventories on over 8,000 items for some of which as many as 15,000 orders a day are received; it enables daily reports for buyers; it tallies orders as received and reports results visually at "impossible" speeds; it can accept figures from 10 operators working simultaneously.

And that remarkable machine can apparently be used for many other purposes! I'm sure it will wind up in the food store.

Where will these developments lead the food retailer—and the food shopper?

I think that mechanical and automaton developments will impel the food retailer and the food shopper in these directions:

(1) There will be a severe reduction in the multiplicity of brands stocked. Mere labels will be dumped. Weak brands, backed only with token advertising, will also be dumped. Only the

strongest brands will survive in this program of brand liquidation.

(2) Store-controlled brands will become increasingly important.

(3) As large retailers tend toward robot techniques, they will find that they can control public brand selection to a remarkable extent by their very robot procedures. Years ago the retailer had to hide a brand behind the counter in order to kill it off. In the future, he may simply break an electric connection!

(4) There will be a vast increase in the speed with which buying will be done within the store. Split-second shopping is on the way for many items.

(5) Men will do still more shopping. Papa will really become a shopper.

(6) The hours of retailing will change to a 24-hour basis. An amazing retail volume will be done through on-the-street vending machines when stores are closed.

(7) The area for promotional maneuvering in the traditional sense will be still further shriveled. In many food supers "promotion" today consists almost entirely of merchandise display.

(8) The window, already in a decline as a promotional medium, will decline more steeply. Mechanized self-service and leisurely window shopping are opposite ends of the pole.

(9) Pricing and discount policies in some fields may have to be revised. The objective of mechanized self-service will be a lower average mark-up, exactly as was true originally of self-service.

(10) Package design will be radically changed. So will the unit of sale. And more attention will be paid to packages and cartons that will save warehousing and handling costs.

(11) Nighttime shopping will pick up enormously.

Robot shopping will compel new thinking by canners with respect to their total programs of moving canned items into consumption, precisely as the semi-robot shopping that is now so common already has done. And robot retailing will also compel new thinking by canners with respect to their total programs of moving merchandise into and out of retail stores, especially in the merchandising and promotional phases of these programs.

No manufacturer who has witnessed the revolutionary changes in shopping and in retailing that have occurred since 1945—in eight brief years!—can take the position that "it can't happen here." In large measure or in small measure, a substantial percentage of our canners will feel the impact of the coming age of mechanical and electronic retailing. The time to prepare for it is now.

Effective Merchandising of Canned Foods—from the Point of View of the Retailer

By Seth T. Shaw,
Administrative Branch Office,
Safeway Stores, Incorporated

I appreciate the opportunity to represent retailers on your program today. While I am speaking for retailers, I have to draw on the experience of our own company rather than industry experience. What I have to say will fit the retail food industry insofar as Safeway is typical of it.

I am sure all retailers recognize the value of a close, friendly, working relationship with our suppliers. Only as we develop better understanding can we deal with those problems affecting you and us. My talk will be divided into two parts. First, I'll review some current developments in the industry which may affect the canners of food, and second, I'll deal with those problems where better understanding and better canner-retailer cooperation can result in more efficient distribution of your products.

The food industry has established a great record in meeting the needs and desires of the American public for more and better food at a remarkably low cost for processing and distribution. At retail we have also given our customers more shopping comfort, parking convenience, and wider selection of food products. The challenge of the future is whether we can continue to improve our record in meeting the pressure of increasing costs without sacrificing any of these services.

In our studies of shopping habits of consumers in relation to the location of our stores, the surveys though not conclusive indicate that customers are shopping less frequently, traveling farther and buying more at a time. A recent check revealed that sales in our new stores are running 40 percent more per transaction than in our older stores. It appears that customers are shopping twice a week instead of every other day as was the normal practice a few years ago. I believe the significance of this trend in relation to your business is obvious. One advantage of canned food is its convenience of storage compared to the fresh and frozen forms. Therefore, if customers are shopping less frequently, they will probably buy more of those foods which store easily and safely.

The greater use of automobiles for food shopping is having its effect. In a week-long survey at one of our stores we found that rider customers spent more than twice the amount per trip than walking customers. The greater use of automobiles at least will not discourage the purchase of heavier items and will also encourage the purchase of products easily stored.

In 1940 we purchased sites for stores which would give us a parking lot the same size as the store. We later found we needed twice the store space for parking—then three times. Now we think we need four times, and in our purchase of new sites we try to get five times the store area. We just don't know where this will end.

I'm sure you will be interested if you have not already seen the latest USDA estimates of the per capita consumption of fruits and vegetables. In a year's time the average American eats a total of 423 pounds of fruits and vegetables. The lion's share of this amount—about three out of every four pounds—is eaten in the fresh form. When we break down the 423 pounds per capita, we find that:

323 pounds are purchased fresh (123 fruits and 200 vegetables)
75 pounds are canned
13 pounds are dried
12 pounds are frozen

It should be encouraging to the canner that while he already has 75 pounds per capita consumption of fruits and vegetables, there is still a long way to go, as the canner, by the new methods of cookery, can capture and hold more of the fresh flavor in the canned products.

You may also have seen the study made by Batton, Barton, Durstine and Osborn showing the percentage of men who shop for groceries, either with their wives or alone. Their study revealed that 77 percent of the men interviewed shop for groceries, and 68 percent of the men shop for groceries at least once a week or oftener. It showed that 38 percent of the men, when shopping alone, purchase more than their wives requested. Of the men who disliked to buy certain items, 43 percent disliked to buy meats, 37 percent disliked to buy fresh produce, but only 6 percent disliked to buy canned foods.

Many of you have read the article entitled "The Fabulous Market for Food" in the October issue of *Fortune* magazine. It makes much of the point that housewives have less time for the preparation of food than formerly, so they are becoming more interested in all types of food which can be quickly and easily prepared. Canned foods certainly fall into this category.

There is no longer any question about frozen foods having a real place in the marketing of fruits and vegetables. Our experience shows that frozen fruits and vegetables with minor exceptions are more competitive with fresh produce than with canned fruits and vegetables. For example, the sales of frozen peas have practically eliminated the sales of fresh peas, but have had little effect on the

sales of canned peas. Our sales of frozen spinach have now passed our sales of fresh spinach and are rapidly approaching our sales of canned spinach. However, canned spinach has suffered little, if any, as yet.

Our sales of frozen corn and green beans have increased greatly, but have a long way to go to approach either fresh or canned. It is possible, but not conclusive, that frozen corn has made some inroad into canned corn, but the same does not appear to be true for canned green beans.

Canned orange juice has been affected by sales of frozen concentrated orange juice, with little effect on the sales of the fresh oranges.

In general, it is our feeling that the frozen products will affect the sales of canned products whenever the frozen form has the superior flavor. Convenience of use is about the same and convenience of storage is in favor of the canned product. If, therefore, canners can improve the flavor of their product, it will be their best defense. On the other hand, if frozen food packers are unable to produce a frozen product which is superior in flavor to the canned, then the canners of these items have little to fear.

Another development favorable to the canning industry is the emphasis being placed on emergency feeding by the Office of Civil Defense. Since canned foods store well, and are quick and easy to prepare under stress conditions and are protected from contamination by radio-active materials, additional favorable sentiment is being created for canned products.

To lay a background for the remainder of my remarks on how retailers and canners may better cooperate on some of our mutual problems, I want to say I recognize that all problems are two-sided. Where differences occur between us, those differences may be based as much on opinion as on facts. We will only resolve these differences by talking about them. I suggest that the President of your Association declare an open season on such discussion.

Number of Items

I will first touch on the problem of space allocation within the retail store. Retailers are often criticized by some of you for not offering a full line of your products. Manufacturers sometime resort to the device of multiplying brands of the same product in order to capture more shelf space. We are not fooled by this maneuver, but this is not the problem I am talking about. I am talking about the criticism that retailers are only interested in fast-moving items and will not carry a full line of products for which there is some consumer demand.

It should be evident to everyone that more products are available to every retailer than any retailer could possibly stock. Each retailer, then, has to choose those most in demand by his particular customers, and the decision cannot be resolved on whether a direct profit can be made on the item or not. For example, suppose 100 items in a super market may account for 85 percent of the total grocery sales.

What would happen if the store were to stock only those 100 fast-moving items? Obviously it would soon lose its reputation and its customers.

A check made a little over a year ago in one of our stores, which had a volume of over $2 million per year, showed this picture: Out of 2,632 items stocked in the grocery section, only 776 items sold as many as 24 or more cans or packages per week; while 233 items sold only one-a-day to one-a-week! With less than 30 percent of the items in what we consider the "fast-moving" category, it certainly cannot be said that we insist on carrying only fast-moving items. As a matter of fact, since this check was made, over 1,000 additional items are being carried.

In measuring the cost of handling an item vs. the cost of not having it for our customers, we lean toward favoring the customer if there is evidence that any appreciable number of customers want the item.

The trend today is to super markets which are one-stop shopping stations for the housewife. This means that many slow-moving items must be stocked. A look at the increase in the number of items handled in the average super market over the past few years is convincing evidence of this fact. More items can be stocked as more shelf space has become available in the new large stores. These stores draw customers from a much wider area than the 1940-type stores, and this increase in customers has served to increase the demand for items that would be considered very slow sellers in smaller stores. Some headway has been made by canners and much more can be made in reducing the size of the case on slow-moving items. The size of case should be consistent with the typical store requirements. A reduction in the case size of items such as hominy, mushrooms, tamales, clams, shrimp, oysters, crab meat, sardines, meats, some soup items, jams, jellies, preserves, olives, pickles, table sauces, and mustard would greatly reduce the case cutting and prewrapping presently required in our warehouses.

Promotions

Another matter I would like to mention. There are only 52 week ends in a year, yet the retailer stocks thousands of items and does business with a great number of suppliers. Therefore, it is necessary for us to work simultaneously with a number of principals in developing promotional plans. There is an opportunity for promoting a number of related commodities at the same time. This requires advance planning; therefore, let me urge you to discuss promotional plans with retailers as far in advance as possible. This will also give you more opportunity to pre-sell the consumer before the promotion. There is nothing so deadening as that "much ado about nothing" feeling as a promotion not properly planned, not properly related, and not sold in advance. Careful attention can be given to variations in normal demand resulting from seasons and holidays, and many opportunities result from shortages in other food lines.

Competition between brands and between commodity groups is exceedingly keen in large super markets, where personal selling is almost a thing of the past. More than ever before, the canner must pre-sell his brands to the consumer. Merchandise support — even representation — in super markets is determined to considerable degree of how well the job of pre-selling has been done.

In-store Promotion Material

In regard to "point of sale" promotions, considerable misunderstanding often arises between you and your retail customers. The problem is less acute with retailers whose stores are all of one type and, within limits, size. Some of us have small, medium, and large type stores. You can add items to your line of products but we are stuck with the size of our stores. In our effort to carry as full a line of products as possible in our smaller stores, it has been necessary to bridge over many aisles in order to multiply space. By the same token, it has cut down "ends" for end displays. It has also made it difficult for us to use a great deal of the point-of-sale promotion material which you canners have prepared. Our policy permits our divisions to accept material which will fit an existing facility. But I'm sure you will agree that the pressure on space in so many retail stores is such that to accept large quantities of this material would create a picture of confusion in the store. And this is no reflection on the quality of the material.

The in-store promotion material must have good art work, stress the quality of the product, give the customer ideas for something different, and, in general, seek to take the "tin can" out of the utility group and invest it with a certain degree of glamour.

The television medium will have its impact, not only on labels, but on the contents of the can. Color television should be a natural for canned food promotion. Not only the label, but the contents of the can must have eye and appetite appeal when opened before the television audience.

Labels

There is also room for improvement in labels to describe more accurately the characteristics of the product. If the number of meat balls, pickled peaches, yams, and other items which are packed whole were stated on the label, it would be a help to the customer. The average housewife does not know that three to four ounces or one-half cup is considered an average serving, so when only the weight or number of servings are stated on the can, she doesn't know whether it will serve six ladies at a luncheon or two hungry workmen. I realize that variations in sizes will cause variation in weight and the number that can be put in the can, but an approximate number would help.

We also need to stress to the housewives the importance of reading the label. They need to know that unless the label states that the cherries are "pitted", the pits are still in the cherries. They need to know that some packers pack different qualities under different labels and this sometimes leads to disappointment when the customer is not aware of the facts. Consumer education is a never-ending job.

Let me say for the benefit of some of you that we still are receiving complaints from our retail locations regarding the careless application of labels to the tins. Improperly applied labels, by use of too much or too little paste, creates an eyesore which can and does affect sales. This is particularly true in an operation where eye-level shelf stocking is featured.

Problems at Warehouse

Many problems affecting you and us show up at our warehouses. The function of our warehouses is distribution—not storage. It is our intention to warehouse just enough of every stocked item to guarantee a continuous supply to our retail locations. Too much inventory is costly, and too little results in stores being without merchandise. Lost sales are also costly. It is therefore necessary for us to plan our purchases well in advance and carefully schedule deliveries if our warehouse function is to be properly maintained. Our grocery warehouse is divided into three areas: the reserve supply area, the selection line, and the assembly line.

Shopping Schedules

Every item has a definite space assigned to it in the reserve supply area, as well as on the selection line. As stocks on the selection line are depleted due to filling store orders, reserve stocks are moved in from the reserve supply area. Consequently, incoming shipments are moved first into the reserve supply area. I mention this detail only to emphasize the importance of deliveries being made according to schedule. Shipments arriving ahead of schedule may find the storage space for that item full. It is necessary then to store milk in the section reserved for canned green beans. When the next shipment of green beans arrives its space is occupied by milk. It is either necessary to move the milk again, or find another space for the beans. You can easily see that much confusion and unnecessary expense is involved unless shipments arrive on schedule. And this brings me to back orders. If something has prevented your complying with shipping schedules and you miss a shipment or two, it is possible we have been out of the item. Those sales are lost and gone forever. Under these circumstances, check with your retail customer before filling back orders.

SETH T. SHAW

For efficient operation of any warehouse, every square foot of space is utilized and the size of the regular working crew is determined by the average amount of tonnage shipped and received. This is also true for working equipment. One can therefore easily see the importance of scheduling shipments to keep the incoming and outgoing flow of merchandise as uniform as possible. When incoming tonnage is below normal, too little work is available for the number of employees and unearned time results. When delayed shipments are arriving and tonnage is above normal, overtime hours must be worked, resulting in unnecessary premium pay.

Intransit Damage

With all the talk over the years on intransit damage, I feel that I must say something about it again today. The fact that shipments from many suppliers seldom show any damage is evidence that this source of loss can be prevented. I'd like to give you a few examples which have occurred just recently on shipments arriving at our Landover warehouse:

Example No. 1—A canned milk shipment of 1,400 cases was received. With each case weighing 54 pounds, this amounted to roughly 75,000 pounds. It was loaded into a refrigerator car on floor racks in a very indifferent manner, with the result that 487 cases were damaged. Many tins had burst, spilling their contents over the cases, spoiling both cases and labels, making it necessary to obtain new cases for repacking of the presentable tins. About 95 man-hours were used in segregating this damage.

Had the shipper inspected this car, he would have tried to secure one with solid floor racks. If none were available, then several layers of heavy cardboard could have been used to cover the open racks. The bonded block method of loading also would have helped to minimize the damage. Actually some of the damage in this car was inflicted by large spikes that could not have been overlooked had the car been inspected by the shipper.

Example No. 2—Just recently, a shipment of seasonal canned goods amounting to 1,500 cases was received, with apparently very little damage. Under ordinary conditions, the clerk checking in this car would have set aside the three or four cases, obviously damaged in the doorway, and sent the remainder into the warehouse. However, due to past experience with invisible damage, each case showing a crease or indentation of any kind was set aside and later inspected. A total of 287 cases were found in this condition, and each case contained from one to six damaged tins, for a total of 35 full cases damaged.

About 27 man-hours were used in segregating, and as this was a seasonal item, sales were lost on the 35 cases.

Example No. 3—A car of canned fruits and vegetables were received from the West Coast. This car contained 1,950 cases of several different sizes and weighed 91,000 pounds.

In this case, the weight was much too great for such a long trip, and in addition, the load was improperly stacked. The result: 151 cases damaged.

Example No. 4—Also a car of canned fruit and vegetables from the West Coast. This car contained 1,950 cases of several different sizes and weighed 75,000 pounds; 317 cases were damaged, largely due to creasing.

This damage also was due to improper loading and inadequate use of safety measures. For example, the

cases were stacked in straight stacks from side to side. Several rows of No. 2 cases were loaded first, then several rows of No. 2½ cases. Then would come a row or two of No. 1 cases. Then more rows of No. 2 and so on throughout the car. Now consider the fact that the No. 2 case is not as high as the No. 2½ case, nor is the No. 1 case as high as either of the other two sizes. As a result, the top end edge of the smaller case, would press against the end section of the larger cases, thereby creasing the end section and inflicting damage on the three or four cans packed across the end section.

A bonded block load with heavy cardboard or shredded paper pads inserted between each block would have prevented this type of damage.

There are many other examples which I could mention, such as the "stop off car" load. A full car of some product is loaded and consigned to several different consignees. The first to receive the car removes its portion and sends the car on. In spite of the fact the car is leveled off before reshipping, there usually is considerable empty space in the car, resulting in shifting cases and damaged tins. A substantial bulkhead between each receivers portion, would eliminate most of this damage.

You can easily see, from the few examples mentioned, that intransit damage is still a very real problem with us. It is necessary for us to carry two or three extra employees at each warehouse for the sole purpose of reconditioning damaged freight. Also, it is physically impossible to inspect every case in every car received. This we know results in much invisible or hidden damage, for which we are never compensated. I want to emphasize again that damage is rare in shipments from many suppliers, it is the rule from others.

Palletized Deliveries

We have been interested for a long time in the possibility of our stores ordering out as many items as possible in full pallet loads. This would permit picking up full pallets from the reserve supply area of the warehouse and transferring them directly to the assembly line, thus bypassing the selection line. Electric jacks are used to load the pallets on the trailers. We can select, assemble, and load a trailer of mixed groceries in about one-fifth the time it takes following the conventional method.

We put this program into operation about nine months ago in our Landover, Md., warehouse and are delighted with the results.

While our stores are not equipped to unload in full pallets, we must continue to unload by hand truck or roller conveyor. We do nevertheless effect a definite saving in unloading the palletized merchandise. This is due to the fact that each palletized item is completely unloaded, piece by piece, before the next item is started. This in turn enables the stock clerk to stack each item neatly and in order, and not lose time finding space to put the cases of many different sizes and weights.

This plan reduces the possibility of the retail store running out of volume items, where sales run heavy for several days.

The potential disadvantages did not materialize. We still get a full payload on each trailer, and the damage in transit is negligible. The 20 retail stores now receiving palletized deliveries are well aware of the advantages and have voluntarily added many items to the pallet order form. We are now shipping about 5 percent of our total tonnage from our Washington, D. C., warehouse by pallet loads.

We have been so well satisfied with the results of this plan that we are trying to interest outside shippers and carriers in adopting palletized shipments.

We induced several companies to run trial loads in to us, and they worked out very satisfactorily. We have received 15 or 20 loads of sugar from Philadelphia, several loads of canned foods from Baltimore, and a great many loads of coffee, soft drinks, and tea from local shippers, and all have arrived in good order.

Our figures indicate the palletized load can be unloaded by the truck driver, using our equipment in about one-fourth the normal unloading time. We then exchange pallets.

Of course our greatest desire is to interest shippers of canned foods by rail cars in the palletizing of their products. We believe a palletized car could be unloaded in about one-sixth the time required to unload by hand. Some of our nearby suppliers have made up a supply of pallets to exchange with us on the delivery of merchandise. This works well for truck shipments, but in case of rail shipments it is necessary to pay freight on the return of the pallets. I believe this can be important enough to the railroads to justify their furnishing pallets. They would not have to pay on their own equipment for the backhaul. The problem is complicated because of the lack of standardization in pallet sizes, but the saving in time would certainly mean a saving in the number of rail cars for handling such shipments.

While some of my remarks today have been critical of some of you, I wouldn't want to leave the impression that we are not appreciative of the fine job being done by the canning industry, by and large. My assignment had to do with problems. Maybe another time you could have me back to talk about the splendid job you are doing and the progress your industry has made.

Effective Merchandising of Canned Foods—from the Point of View of the Canner

By J. B. Weix,
Oconomowoc Canning Company

The question "Who will you sell?" was my introduction to the canning industry. Back in 1919, fresh out of the Navy, my first concern was to find a job. Well do I recall an interview with one of our leading neighboring canners. In answer to my inquiry as to what advice and counsel he could give me about entering the canning business, he exclaimed, "Who will you sell?"

Then he said, "Look, son, my company has been in business since 1895. We are one of the largest pea canners in the country. Every year I go out and call on our customers and tell them exactly what we can supply them out of the coming year's pack. After we book the cream of this business what is left? Just the crumbs, and, son, you'll never make any money picking up the crumbs."

That was in the good old days, and even then they said selling was difficult. Maybe this canner was my best friend because he challenged me!

So, in spite of contrary advice and forewarning about the dangers, my brother and I launched into the canning business. Well do I recall attending my first national Convention, held right here at the Traymore Hotel in January of 1921. My brother and I arrived in Atlantic City without hotel reservations, just followed the crowd to this hotel and successfully talked the management into assigning us a room. I think he just felt sorry for a couple of country boys stranded at the Convention.

You old-timers will recall the large, buzzing, milling crowds in the lobby on the Convention floor. Men and companies were judged in importance by how often bell boys were paging them. I can assure you no one ever paged Joe Weix. We were strangers in the crowd. A certain feeling of loneliness came over us and we felt that perhaps we should have accepted the advice of the neighboring canner and stayed out of the canning business.

However, the next morning bright and early we headed for the Million Dollar Pier to see the giant Convention machinery exhibit. Here, too, we were newcomers and I well recall the policeman at the gate holding up our admission to the hall because we did

not have a membership badge. That was our introduction to the National Canners Association. But, we had come a long way, out of Wisconsin, and no one was going to stop us now, so we signed up as members of the Association? We have been proud of that decision ever since. Knowledge that we were now part of the official group known as the National Canners Association gave us new confidence and was the means of our meeting many men in the food industry who today are our closest friends.

Yes, it has been a long winding trail from that Convention of 1921 to this speakers' platform. In this interval of time we have all witnessed great changes in the canning business, and likewise in the distribution fields.

Many of these so-called "cream of the crop" customers, whom everybody tried to sell back in those early days, have fallen by the wayside. A brand new type of outlet for our packs has appeared on the scene, fewer in number, but many times larger than those they displaced.

As we face the future a great horizon looms up. But again that challenge faces us all: "Who will you sell?" One thing is sure, the mere fact that one has had success in the canning business in the past is no assurance of success in the future. Complacency today may spell ruination tomorrow because we are heading into a push-button age. To meet this challenge we may all have to change our thinking about merchandising as well as production. The time has come when we've got to streamline our operations to a fast-moving parade.

At this point I would like to comment about the future of the small canner. I do not agree with the prophets of doom, who say his days are limited. I grant that business is drifting into fewer hands and larger operators. But let no one scare you into believing that the efficient small, one-plant canner is doomed and going to pass out of the picture. No machine has yet replaced smart, far-sighted management.

Ask yourself these questions: "What is my packing plant?" "What is my cannery?" The answer, in very simple language, is that our plants, our canneries are the "kitchens of America." Let me say it this way. We work in the kitchens of America. Let's stop calling it a "factory."

Sure, our work entails preparing the gardens, planting the fields, cultivating the crops, spraying the orchards, and gathering the harvest. But don't forget, it's in our "kitchens"—where the fruits and vegetables are properly prepared—that we do for the American housewife those tedious chores her grandmother accepted as part of her daily routine job—and we do them better!

It's an accepted fact that today Mrs. Housewife demands ready-cooked food of truly fresh quality that can be served in appetizing dishes in a short period of time. Women want to spend less and less time in the kitchen, especially the 10 million that return home daily from outside jobs.

We can give the housewife what she wants. The challenge before us is to bring our finest quality foods into the home. And if we do, we will be invited back again and again. The time has come for the canning business to take the offensive and give proper leadership to the food business.

So I say that the first step in the successful merchandising of canned foods is to modernize our present canneries and make them as attractive

J. B. WEIX

and as spotless as any American housewife's own kitchen.

Last spring I visited a cannery of this type near Stockholm, Sweden. I was amazed to find this very modern plant, in my European travels. We were shown the cannery by way of a visitors' gallery. This corridor was attractively tiled, running the entire length of the building and gave visitors an excellent view of the entire canning operation. I asked my Swedish canner friend what prompted them to build such a show place in the cannery. He told me that this plant was built as a wartime economy measure to assure his country the harvest of the fields. Swedish housewives by custom and tradition, also being thrifty, were not accustomed to buying canned foods freely. They were prejudiced against mass cannery production. This canner had the vision and know-how to overcome this resistance. Today his company enjoys a tremendous canned foods business in Sweden and the demand for their brands is constantly growing.

This company met the challenge and they have given us an answer in meeting our selling problems of today. Yes, we've got to take the offensive. We must show the housewife that we are pledged to pack for her the highest quality foods under the most sanitary conditions possible. The cannery of tomorrow is going to be a show place and those who open their gates to public inspection will receive consumer preference from those who see their operations. Your visitors will be a part of your sales force.

I cannot leave it unsaid that our kitchens must be supervised by energetic and intelligent men. Today universities throughout the country offer specialized training courses in the canning industry. It is here that you will find trained men. I encourage canners to give consideration to setting up scholarship plans to insure proper training for others to take over our job in later years. What finer contribution can one make in his community? Let us also encourage our own state associations and industry groups to give consideration to underwriting these scholarship funds. If this push-button, automatic cannery is in the making, we must have better men on our mechanical staff and perhaps we must become better acquainted in the field of electronics.

Nor can I leave it unsaid that management must be constantly seeking to improve the product and the processes. I encourage you to expand your raw product department. To meet the consumer's needs of tomorrow we must find new and better strains of seeds and plants. Right here on the Convention floor there are seedsmen who would welcome working with any canner in testing and developing new varieties of seeds. As a one-plant operator, it would be a natural to be the first in the market with a new hybrid. Anything that is new and different in the early development stage is always in limited supply. It is in this particular field that small operators can excel and be the first in the market with new products. Remember, a premium product brings a premium price!

Let's take a lesson from our super market friends. The other day a buyer took me on a tour of some of the more progressive stores in the Milwaukee area. I was intrigued with the beauty of the layout and the manner in which the various foods were displayed. I remarked that it was entertaining to visit such market places. I had a hard time to keep my buying impulses in check and pass by the many attractive and appealing displays. Shopping is no longer a chore, It is not necessary to prepare a long shopping list of items to buy. Impulse buying fills up your cart with the greatest of ease. Did you know that 48 percent of canned vegetable purchases are impulse purchases? That is why it is most important that we

get our brands properly displayed in the retail stores.

In recent interviews with officials in retail food distribution, I have been told that the canned food department is today the backbone and the most profitable part of their business. They admit that this department has been neglected and that it should receive more attention in the future. That's where our merchandising ideas must be put to work. We must see to it that our canned foods regain their share of space on the shelves. If we expect to continue to be an all-important part of the super market operation, don't you think it is about time we become partners of Mister Super Market and find out how both of us can live under the same roof? It is time for both of us to sell more and enjoy a greater profit.

J. Sidney Johnson, Director of the National Biscuit Company, very ably described the situation when he said, "This is the test every salesman should be able to pass: He should walk into a big shining super market, stand in front of his own merchandise and then ask himself, 'What have I done in this store to increase sales and assist the operator in making more money with the sale of my brands?' "

If he can honestly show that through his individual efforts a greater volume sale is registering itself, he then can declare himself an expert in real distribution. If not, he had better step aside and let someone else take his place. The revolution in retailing is moving too fast for the old-time salesman who depends on his ability as a story teller or back slapper to get business.

We must encourage our retailers to give us a better break in the store of tomorrow. Prove to them it's to their selfish interest to do so. We canners want the broad main aisles for our beautiful, modern, attractive new design labels. We want to see these well stocked shelves spotlighted. Yes, we want to see our canned foods glorified. We want attractive mass displays properly priced for a fair return for both distributor and canner. We want attractive scenery above the shelves of canned fruits and vegetables reminding Mrs. Consumer of the bountiful gardens and orchards from where these choice canned foods originated.

This cannot be yours simply for the asking. Again I repeat, we've got to show the retail trade that it's to their benefit to work with us in a more effective merchandising of canned foods.

Certainly this teamwork is logical enough when you consider the millions and millions of dollars spent yearly, advertising canned foods through the pages of newspapers and magazines and over the air waves via radio and TV. During recent years we have had many helpful promotion and advertising programs carried out by the Can Manufacturers Institute and through group action. This service offers excellent opportunity for canners to promote the sale of their production.

I have just learned of another very timely program directed to homemakers through a series of large, full color advertisements in leading national magazines. One of the major can companies will show millions of women how to serve their families canned food meals that are appetizing, nutritious, easy to prepare and economical. Yes, canned foods are going on full-dress parade.

In addition, it is most encouraging to learn that others may join us in projects that will likewise spearhead this new leadership. We are determined to build a greater prestige for canned foods so that they are served not only during the working week, but likewise are served to guests for Sunday dinner. A program designed to build prestige will strengthen the housewife's attitude in favor of canned food at point of sale and will result in increased purchases.

These efforts to broaden the use of the products we pack not only offer us an opportunity to tie in our own merchandising, but also work to the advantage of the retail food merchant —provided he properly stocks and displays the products Mrs. America will be looking for in order to feed her family these glamorous meals.

How often have you heard someone say, "I'd like to be 'Boss' of that outfit about six months"? The speaker may have had various things in mind, but I wonder if he ever carefully thought through just who is "boss" in our canning kitchens of tomorrow.

The real "boss" of the cannery kitchen of tomorrow will not be the president, sales manager or production manager. The real "boss" will be the consumer and if anyone thinks otherwise he is heading for trouble.

Granted, there are some men in executive positions who are inclined to make business decisions in accordance with their own personal tastes, desires, even prejudices, but men like that are not likely to be very successful or to retain such positions for very long.

The head of a business is really "capable" only as he serves the needs and desires of his ultimate consumer and directs the efforts of everyone working in the canning kitchen toward meeting those needs successfully. In short, he must learn what those consumers want and see that they get it.

If the executive of a canning company does not pack the right quality, or if his prices are too high, the buyers go elsewhere and he either mends his ways, sells his cannery, or he may even go bankrupt. Similarly, the jobber or retailer who stocks merchandise which does not please the buying public or does not adequately serve its needs will certainly see the customers go across the street to another store.

The driving force of this great canning business is competition. Every canner, from the smallest cannery to the largest, every merchant, from the family store to the mighty chain, must meet competition every working day. Yes, indeed, it is competition for the good will of the American homemaker, who is our real "boss".

So, watch out, Mr. Canner, that what you're doing—and how you're doing it—is done well in mother's kitchen.

In concluding my speech, I would like to say it is my opinion that we are entering a new era in the canned food industry. The elements of this new era will be turning our factories into modern kitchens, working with our colleges in developing men and technical improvements, modern merchandising in our retail outlets, but, most important, recognizing that our real "boss" is the consumer's demand for better quality at a fair reasonable price.

The decisions and leadership that the National Canners Association has written into the records of this Convention will mark the beginning of this new era. Every canner in the industry is proud of the excellent work of Bill Free's special fact-finding committee. Their report and recommendations are commendable. We are proud of our Association for approving and appropriating the necessary funds in accepting this report. In my opinion, this is one of the most progressive and important steps that we, as an Association, could have taken at this time. The entire food industry owes a vote of gratitude to those who so generously gave their time and efforts.

The constructive approach of assembling the facts, and then proceeding to carefully evaluate them, has resulted in the development of this program of promotion and publicity from which every canner can benefit. Leadership has been shown. We have closed ranks and we are all going forward together. Every canner now has a real responsibility on his own shoulders to follow through. The next step is ours. Let's not lose our way.

Join with us and go out and tell this story again and again. Our association has given us the leadership, the new sales approach and the tools. You, too, then will have found the key, opening new outlets for effectively merchandising your production, and at a fair profit.

N.C.A. RESEARCH ACTIVITIES

How the N.C.A. Laboratories Serve the Canning Industry

By E. J. Cameron and J. R. Esty,
Research Laboratories,
National Canners Association

Our laboratories have been in existence for 40 years, during which time several outlines of our laboratory activity have been presented to the industry. One might think that by now it would be a very easy matter for the two of us to draw up a simple statement of things that we do and how we work with the industry, but each time that the necessity to describe our functions arises it seems that we have to start from scratch and cover the assignment as though it had never been done before.

Neither of us can tell you just why this should be. The pattern of activity doesn't change radically from year to year, although we can observe some changes in the trends of continuing projects as well as in emphasis on research or on technical service.

At this point I think that our own meaning of the two principal divisions of laboratory activity should be mentioned. Roughly, they may be referred to as "research" and "technical service." These principal classifications serve well to describe general activities, although work done under the two headings is often interrelated, and we could do considerable subdividing in either category. It seems to us impossible to designate every project strictly as "research" or "technical service," and personal opinion plays a large part in deciding in which category an activity may fall.

E. J. CAMERON

For example, "research" can be broken down into "pure" and "applied" research or, as a former chairman of the Research Committee used to say, "capital R" and "small r" research. Of course we have worked with both kinds. Sometimes the "capital R" develops into "small r" and vice versa. This has been especially true in certain spore resistance studies. We find, therefore, that we need elasticity in our programs to meet the conditions that arise.

Then again, we may undertake a research project that eventually goes over into the technical service field. For example, our long-time field studies were certainly in the applied research category when they began back in the 1920s. As time went on there was a gradual transition from research to direct service. Now, when our field laboratory goes into action there is usually a combination of both. Spoilage prevention is always emphasized as a service feature, but there usually are new types of equipment and new canning practices to be studied, and such work is definitely in the research field.

As a practical matter, our technical service problems provide the most important leads to needed research which is a strong argument against making fine-spun distinctions between research and service. Our responsibility to the industry, as we see it, is to pursue studies that relate to the public health safety of canned foods and the economical packing of them, with emphasis on spoilage control and quality. Whether work toward these ends is called research or service is not too important.

Safety of Canned Foods

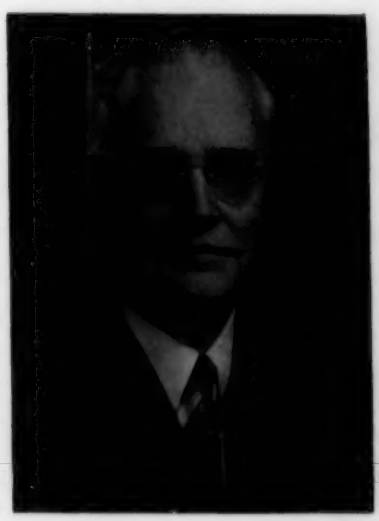
The historical background to that part of the work of the laboratories related to safety of canned foods was presented at a conference held during the period of the August, 1953, meeting of the Society of American Bacteriologists.[1] It was recalled that the N. C. A. Laboratories were organized in 1913, with the late Drs. W. D. Bigelow and A. W. Bitting in charge. The first major investigative work in the laboratories began in 1917 with public health problems as focal points. Special emphasis was given to chemical and clinical studies on so-called ptomaine poisoning, and a substantial beginning was made in the study of botulism. Ptomaine poisoning was effectively ruled out as a causation of illness from canned foods because it was shown that infected food and not ptomaines was the basic cause of illness from food poisoning. The whole investigation of these factors presented an ideal example of collaboration between the industry laboratories and those of outstanding stature in the public health field. Eminent researchers were represented in this work, including Drs. K. F. Meyer, E. C. Dickson, J. C. Geiger, and M. J. Rosenau. All through our history this kind of collaboration has been continued, as is amply illustrated by our recent nutritional and present insecticide programs.

In 1919, and for a time thereafter, studies on prevention of botulism were foremost in importance. About that time the first well-defined work on process determinations was done, principally in the N.C.A. laboratories. A really monumental contribution to this subject was the development of methods for mathematical solution of processing problems by an Association staff member, Dr. C. O. Ball, who was then a pioneer and who is now a leader in this field.

The excellent record of controlling botulism in commercially canned foods by the work of the canning industry in the United States has been due to continuous research and educational programs. Since 1925, only two instances of botulism from commercially canned foods have occurred, one in 1941 and the other in 1950. The 1950 incident possibly should not be included because it was due to a partially processed product.

The work on botulism which began a little before 1920 and the collateral studies on processing which played a primary part in control of botulism have been continued in one phase or another since that time. The primary test for a new or suggested steriliza-

J. R. ESTY



tion method is its effect on *Clostridium botulinum*. When antibiotics were suggested as adjuncts for processing of low-acid canned foods, it was shown that none which had been studied would destroy the organism with certainty under the conditions of use that had been suggested. Again, in our recent research on gamma ray sterilization, principal studies have been on the effect on *Cl. botulinum*. Strains of this organism used by us in our radiation studies have shown the highest resistance of any spores tested by us thus far though they are not by any means the most resistant to heat.

Processing studies of low-acid foods to determine minimum cooks have been conducted continuously by the N.C.A. Laboratories in Washington, D. C., and in the Western Branch Laboratory. Several industry laboratories have also collaborated. Both the experimental pack procedure and calculations based on heat penetration and thermal death time data have been employed in these studies. Since 1929, there have been periodic conferences of the N.C.A. Processing Committee to decide upon new matter to be written into Bulletin 26-L.[3] This Committee is made up of members from different laboratories connected with the canning industry which give continuous attention to processing problems. In 1948, a companion committee on processing of glass packed foods was appointed and Bulletin 30-L[3] contains its recommendations for safe glass processes. No changes are made in the revision of either bulletin without appropriate action by the proper committee.

Relations with Other Agencies

We have just referred to the collaboration with other laboratories on problems of primary importance to the canning industry, and now want to stress again the role that cooperative effort has played. At no time has the evolution of canning industry research resulted from a single effort. From the beginning there has been cooperation among the many agencies having the industry welfare at heart. Even before the National Canners Association laboratory was started in 1913, there was at least one large cooperative research project sponsored by the newly formed National Canners Association and participated in by the manufacturers of steel plate, the fabricators of tin cans, and the officials charged with the enforcement of the newly enacted pure food law. This project included the preparation of a large number of carefully designed experimental packs to find out about the amount of tin and iron actually to be found in canned foods, and about their possible effect on human health. Many of us have only a hazy recollection of the crisis caused by allegations of ill effects produced in humans by salts of tin. It proved that fears were based on misapprehension, but the idea was rather widespread in those days.

Shortly after the laboratory was established, we were urged to help the canners of corn prevent large losses from sour corn. We were told that if this one problem could be solved, it could mean more to the canning industry than the laboratory would ever cost. Here again, in cooperation with other agencies, studies were both timely and effective and for years now the old-time common thermophilic spoilage of canned vegetables has been under control. Background work in these spoilage studies had been done by such men as S. C. Prescott and L. W. Underwood, H. L. Russell and Bronson Barlow. This fundamental bacteriological research coupled with basic original work on heat penetration conducted in our own laboratories laid the basis for our process times. The development of proper process times for all types of low-acid vegetables has been, and will continue to be, a major responsibility of the Association Laboratories.

Nutritional Information

When vitamins first attracted public attention, wild claims of various kinds were made, usually to the detriment of canned foods. Cooperation with certain universities, principally Columbia University, led to the first understandable scientific presentation of the true status of vitamins in canned foods in N.C.A. Bulletin 19-L by Drs. Kohman and Eddy[4]. The first program led subsequently to our broad nutrition program which commenced in 1942 and which is still active. The canning industry finds it necessary to have scientific knowledge to offset unfounded assertions about lack of nutrient factors in canned foods. This program has been carried on so aggressively and successfully that nutritional information for canned foods is the most complete for any processed food.

When the N.C.A. laboratories were first founded, there were no other comparable industry laboratories to assist in these specific problems of the canning industry. Since that time, however, many outstanding laboratories have been developed by the can manufacturing companies, the steel mills, the canning machinery manufacturers, the suppliers of various commodities for the canning industry, and the individual canning firms. It has been a great pleasure for us to observe the development of these laboratories and we are proud of the fact that many men trained in N.C.A. Laboratories have been leaders in their development.

Pattern of Activity

From the examples that have been given, it is apparent that many of the major activities of our laboratories have been undertaken in response to generally recognized needs. However, it has always been true that there are more problems awaiting solution than we or any other single organization could hope to tackle. This means that some selection has to be made in the interest of a sensible program and to keep within the resources that the Association can reasonably provide. The Directors of the Laboratories do not, and would not wish to, make this selection without the counsel and guidance of the Association committees that have been wisely constituted for that purpose.

Anyone who studies the structure and operation of the National Canners Association will be struck with the degree to which its affairs are guided by committees appointed from the membership. These members serve at considerable sacrifice to themselves in order to promote the welfare of the industry as a whole, and this is as true of the research committees as it is of the others.

Briefly, the research committee structure includes five groups. The principal one of these is the Committee on Scientific Research; it has the general responsibility of recommending research budgets and guiding the programs of the laboratories. It is assisted in these tasks by four other groups, two each for the Washington and Berkeley Laboratories. In each case the local Laboratory Committee works with the Director and his staff in the preliminary phases of budgeting and in giving shape to the program of laboratory activities. In addition, each Laboratory has a Laboratory Advisory Committee made up of technologists from the canning and allied industries, who review the progress of projected work, make suggestions on methods of attacking problems, and serve as a source of information on problems confronting the industry. When a project calls for cooperative effort, these Advisory Committees give loyal help in organizing the necessary cooperation. We believe the mere description of this committee system is enough to show its advantages, and it is working very well in practice.

Now to simplify discussions of current laboratory operations in an illustrative way, we reproduce a page from our current pamphlet "For Those Who Can." This page provides a very good schematic description of our laboratory activities, but for the purpose we have in mind further discussion of specific activities is in order.

Bacteriology

Spoilage Prevention — The first point indicated is spoilage prevention, for which the field studies of both Eastern and Western Laboratories

Research Laboratories

Practical research and service in . . .

BACTERIOLOGY

Spoilage Prevention
Ingredient Quality
Canned Food Storage

WASTE DISPOSAL

Cooperative Research
Treatment and Disposal Studies
Research into Methods

THERMAL ENGINEERING

Process Determination
Bacterial Heat Resistance
Canning Procedure

MICROANALYSIS

Training of Microanalysts
Identification and Classification
Coordination of Methods

SANITATION

Personnel Education
Factory Surveys
Sanitation Techniques

CHEMISTRY

Canned Food Standards
Insecticide Residue Studies
Special Quality Problems

COMPLETE MOBILE LABORATORY FOR FACTORY STUDIES

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are excellent examples. In short, the job is to locate sources of spoilage contamination and get rid of them. Frequent tests are made at the home laboratories in the study of samples of spoilage and in the diagnosis of cause of spoilage.

Ingredient Quality—Our best example of "ingredient quality" is the many samples of analyses applied to sugar and starch. Other ingredients, including spices, are tested where they are to be used for products which are susceptible to bacterial spoilage.

Canned Food Storage—Storage effects, especially the possibility of delayed spoilage, are determined largely through incubation of canned foods, and a great many such tests are made.

Thermal Engineering

Process Determination—Each year we have numerous requests for process recommendations for new or modified canned foods. This type of work will continue into the future for many years. Bulletins 26-L[2] and 30-L[3] illustrate the use to which the results of this phase of work are put. It is also done in response to requests of individual members of the Association.

Bacterial Heat Resistance — Heat resistance values must be used in process calculations. Methods now used in heat resistance determination are the result of many years of research.

Canning Procedure—Many inquiries concerning canning procedure come to the Laboratories. Bacteriological, chemical, and technological experience are applied to these questions. Correspondence with a member on such questions is confidential.

Sanitation

Personnel Education — This has been a major part of the sanitation program of both the Washington and the Western Branch Laboratories. It began in 1945 when a special course was set up at the University of California, followed by publication of the manual "Preliminary Draft of a Sanitation Manual for Food Industries"[5]. Recently, in 1952, a book on sanitation, "Sanitation for the Food Preservation Industries," was published by McGraw-Hill[6]. The book was written under the auspices of the Association of Food Industry Sanitarians with N.C.A. personnel from the Western Branch Laboratory taking a major part. The emphasis that has been placed on such education has resulted in sanitation improvement in all canning areas.

Factory Surveys — These surveys have been made on a country-wide basis. Canners have been advised of changes that should be made to meet sanitation requirements.

Sanitation Techniques—As part of the educational aspect of this important work, sanitation methods, and means of determining the adequacy of these methods, are taught to men designated by the industry membership.

Waste Disposal

Cooperative Research—Here again cooperative research with state departments of sanitation, and particularly with the Wisconsin authorities, has paid big dividends for the industry. Work of this nature has been in progress for a number of years.

Treatment and Disposal Studies—This is illustrated by investigations on lagoons and the use of materials to suppress odor development. Recent work has been done on aeration and waste disposal by spray irrigation.

Research into Methods—We are on the alert for new methods, or methods in use on other types of waste which may be applicable to canning waste. Also, the methods of evaluating waste strength come in for critical study at times.

Microanalysis

Training of Microanalysts — For years there has been a system of education of microanalysts applied both in the East and West. Schools for analysts are conducted yearly either in our own laboratories or in experiment stations.

Identification and Classification—In the case of foreign material the identification of it becomes highly important. Our laboratories undertake such work as a matter of research and for the various members.

Coordination of Methods—This is of great importance where a number of laboratories are involved and where certain methods are somewhat empirical in nature, requiring strict adherence to a prescribed technique.

Chemistry

Canned Food Standards—Work on standards has engaged the active assistance of the Laboratories ever since the passage of the present food law. A large amount of work in the laboratory and in conference is devoted to this requirement.

Insecticide Residue Studies—These are currently very active in view of imminent legislation. Here again collaboration with outside laboratories is in progress.

Special Quality Problems — These deal principally with quality improvement and product abnormalities.

Cooperation with Claims Division

In addition to the obligations to which we have referred, the Laboratories have long assisted and collaborated with the Claims Division in developing technical details of defense in connection with food claims. A typical example of assistance in a food poisoning case may begin with a technical review of an investigator's report. At about the same time investigator's samples of food acquired from a suspected meal may arrive for examination. The sample is tested for the presence of food poi-

soning bacteria and, by feeding tests, for other poisonous materials. All this may be followed by one or more conferences concerning the significance of our findings in the circumstances of the case. Similar steps are followed in claims involving foreign substances, except for the difference in the details of examination of the sample. If the case goes to court, more conferences will result and we frequently are called upon to supply expert witness testimony at the trial.

The importance of this kind of work is obvious from claims experience. In 1952, 1,601 new cases were reported for investigation and handling. A total of 138 new suits were filed. At the end of the year there were 230 suits pending. Twenty-four cases went to trial during 1952. These figures suggest clearly that a great deal of laboratory work is required in helping to place our Claims Division in an advantageous position in its handling of cases.

The Canners' Part

We would not find it difficult to reorient our subject matter somewhat and write a companion paper titled "How Canners May Get the Most from N.C.A. Laboratories." We have attempted that approach in the past, but the most important consideration, it seems to us, is that the canner give attention to N.C.A. literature which reaches him and gain some realization of what the Laboratories have to offer. Then when any technical problem arises, write to us about it. Some laboratory work, as in the case of spoilage diagnosis, may be necessary and it is available. Perhaps technological advice is called for and it will be given to the extent that it is available. If consultation with other agencies on some phase of the problem is necessary, we are quite willing to cooperate fully in that way too. Our principal request is that you write to us whenever you feel the need for technological advice.

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CANNERY BOILER OPERATION

Effect on Containers of Boiler Water Carryover

By A. E. Mudra and Randall Royce, American Can Company

In recent years there has been a marked increase in the frequency of cases of impaired external appearance and performance of processed food containers which are traceable to problems of cannery boiler operation. The current importance of this problem has been brought about by two major trends which have developed in the canning industry during and since World War II: first, the tendency toward higher volume plant production without a corresponding increase in boiler capacity, and second, the wide-scale adoption of lighter tin coatings for most classes of food products.

The first of these factors, namely the increased demand on boiler capacity, developed to a large extent during the war years when the nation's canning plants were called upon for maximum output of military and civilian foods at a time when items of heavy equipment such as steam boilers were difficult or impossible to obtain. In the postwar years the trend toward higher plant production has continued, and high-speed fillers, closing machines, labelers, casers, and other equipment have kept pace with this trend. As a result of the general speedup in production, retort capacity became a bottleneck and most canners have had to install additional retorts, lengthen the standard three-crate retorts to four-crate capacity, or otherwise provide extra processing facilities. In general, however, the plant boiler capacity remained constant during this period of change, and the result was that the boilers were overloaded more and more in an effort to meet the plant requirements for steam.

Without going into detail as to the effects of operating a steam boiler beyond its normal capacity, it may be said that the problem has been recognized by most canners and more careful attention to the details of boiler operation have, in most instances, enabled the increased steam demand to be met successfully. However, the margin of safety which formerly existed has been reduced in many installations to a very low level, and instances of trouble due to a carryover of boiler water or solids in the steam supply have become numerous.

During the same period in which the problem of boiler water carryover has become serious, the effects on tin plate containers from contact with concentrations of alkaline salts became acute in some locations so that monetary losses occurred through unsightly detinning and rusting. A minor but obvious factor was the reduced tolerance of electrolytic tin coatings to adverse conditions of this type. Adoption of electrolytic tin plate received a major impetus during World War II when it became necessary to distribute the limited tin supply over the largest possible area of plate. The experience gained during the war years proved that the use of electrolytic plate was commercially feasible for many food products, and in the postwar years extension of the use of reduced tin coating weights has continued for economic reasons.

Economy of Electrolytic Tin Plate

The dollars-and-cents savings to the canner which have been made possible by use of reduced tin coatings are frequently overlooked—particularly when a problem of container performance arises—and it may be of interest to mention an example of the economies which have been effected.

For such large-volume items as peas and corn the standard container at present carries a tin coating weight of 0.25 pounds of tin per base box, or one and a quarter pounds per base box less than the hot dipped 1.50 pound plate used for these products before World War II. This saving in tin is directly reflected in the price of tin plate (and, in turn, in the price of containers), and if these economies had not been effected the industry's can bill for peas and corn alone would have been increased more than $5 million for the year 1953.

In view of these substantial raw material savings which are passed on directly to the canner, it becomes readily apparent that some extra care and expense to provide proper handling conditions for the electrolytic plate cans is economically justified. The maximum economy in container cost is realized where electrolytic plate can parts can be used plain outside with the recognition that some extra precautions may be needed. Since water supply, operating conditions and storage vary widely between canning plants, each canner should decide with the aid of technical evaluation of these factors, whether outside enameled electrolytic plate is needed to control external rusting under his situation. However, as discussed later, protective coatings can be expected to be effective only in the milder cases of alkaline boiler water carryover and electrolysis during processing.

Effects of Alkaline Carryover

It has been mentioned above that boilers operated beyond their normal capacity (or those operated improperly) often permit a carryover or en-

trainment of alkaline material in the steam. This alkaline carryover contacting the cans at the high temperatures prevailing in the retort may affect the containers in several ways, including removal of the tin from outside plain cans, removal of outside enamel or lithography, or the formation of an unsightly white deposit on the outside of the cans.

Detinning by the alkaline carryover is more serious in its effect on electrolytic cans simply because the initial tin coating overlying the iron-tin alloy layer is thinner than on hot dipped plate and removal of a given amount of tin causes a proportionately greater loss of the protective coating. As tin is dissolved in an alkaline solution the container first loses its bright appearance and becomes dull and gray in color. However, during continued exposure to the alkaline solution the tin continues to dissolve until all of the "free" or metallic tin is removed. At this stage the effect on the container is serious; the exposed steel base and the tin-iron alloy layer are black, unsightly in appearance, and tend to rust very readily during subsequent water cooling and storage. Inasmuch as the solution of tin occurs uniformly from the surface toward the base steel, it is apparent that present-day containers with light tin coating weights will not tolerate as much exposure to alkaline boiler water carryover as those formerly used. Figure I illustrates an instance of typical detinning and rusting of outside plain No. 25 electrolytic plate cans processed in steam containing an alkaline carryover. It will be noted that the detinning occurred on the container surfaces directly contacted by the steam, while those areas not in the direct path of the incoming steam remained bright and unaffected. In some instances the detinning appears in the form of round spots corresponding to the pattern of perforations in retort crates or dividers.

In addition to the type of detinning in which the cans are directly contacted by steam carrying entrained alkali, instances may occur in which the detinning is confined to cans submerged in condensate collecting in the bottom of the retort. This condition frequently occurs with No. 10 cans where a water cushion is provided in the bottom of the retort as an aid in pressure cooling. With this method of operation the steam is admitted through a bottom inlet and thus any carryover of boiler water in the steam would accumulate in the water cushion. If an appreciable alkalinity is built up in this layer of water, the cans in the bottom layers in the retort may then show detinning up to the level of the water. Detinning of this type may also occur where processing is carried out without a water cushion in the retort, but where sufficient condensate containing alkaline carryover accumulates during the process to reach the bottom layers of cans. Similarly, detinning may also occur on cans which are processed in boiling water in open retorts. Here, carryover in the steam may result in a sufficiently alkaline buildup to cause tin removal. In water processing or exhausting where heating is by closed coils, care must also be taken to prevent concentrating the alkaline salt content of mineral bearing waters, by sufficiently frequent changes of water.

FIGURE I

Rusting of Cans as a Result of Tin Removal by Alkaline Carryover of Boiler Water in Steam

(Rusting is confined to portions of cans directly contacted by alkali.)

Staining of Cans

Somewhat related to the problem of detinning by an alkaline carryover in steam is a discoloration which may occur where cans contact iron retort crates, trucks, or baskets. This discoloration is sometimes referred to as "steam burn" and may appear as a yellow, brown, or purple stain on the can surfaces in contact with the retort crate. Where perforated crates are used the pattern of the perforated areas may appear as bright, unstained spots while the remaining surfaces contacting the iron show the discoloration. Detinning of this type is illustrated in Figure II. This laboratory recently had occasion to investigate a

FIGURE II

Detinning of Areas in Contact with Perforated Retort Crates

(Cans on right in each row also show rusting of the detinned surface.)

problem involving staining of this type where the cans were processed in wire trays. In this instance the discoloration appeared in the form of one or more marks across the end of the can contacting the tray during the process.

Investigation of this problem revealed that the discoloration was electro-chemical in nature, with a galvanic cell being formed by two dissimilar metals (tin from the container and iron from the tray) in the presence of an electrolyte (alkaline carryover in the steam and/or water hardness scale on the trays). The degree of staining on the containers appeared to be directly related to the amount of alkaline entrainment in the steam, and on occasions when foaming or priming of the boiler was most severe the discoloration progressed to actual tin removal down to the base metal. Some of these extreme examples are illustrated in Figure III.

Stripping of Enamel or Lithography

Removal of outside enamel or lithography may also occur as a result of boiler water carryover in the steam. These outside coatings are resistant to moderate amounts of alkaline carryover in the steam but where the cans are submerged in an alkaline condensate during the process, partial to complete removal of the outside coating may occur. These instances are usually recognized readily, since the difficulty is often confined to cans in the bottom of the retort. In extreme cases, enamel removal may occur at other parts of the retort where steam directly impinges on the cans.

FIGURE III

Staining and Detinning of Can Ends at Points of Contact with Wire Processing Trays

Figure IV shows an example of lithography removal, and it will be noted that detinning has also occurred on the plain top end of the can and along the side seam area.

FIGURE IV

Lithography Removal from Alkaline Carryover in Steam

Mineral Deposits on Cans

Boiler water carryover in the steam supply may also manifest itself in the form of a white deposit on the outside of the cans as illustrated in Figure V. This deposit characteristically consists of insoluble carbonates and sulfates which adhere to the container surfaces and are not removed when the cans are water cooled in the retorts or in a cooling tank. When caused by boiler conditions, such deposits result from a buildup of solids in the boiler, and subsequent carryover into the steam lines and retorts. In severe cases, a layer of white precipitate may be observed in the bottom of the retort at the end of the process. Quite often this condition is not associated with excessive alkalinity of the steam or condensate, and the tin plate is found to be bright and shiny when the surface deposit is removed by rubbing. The formation of this deposit on the cans is therefore objectionable only from an appearance standpoint, but removal of the deposit may require hand rubbing with a cloth or thorough mechanical buffing of the cans with soft buffers. In some instances the deposit formed on the cans in this manner may hold atmospheric moisture and promote rusting during storage.

Remedial Methods

Methods of controlling or minimizing the foregoing effects on containers usually require individual consideration, and depend upon the particular steam problem involved. In many cases the ultimate solution to the problem may require engineering changes.

FIGURE V

Solids from Boiler Water Deposited on Can Ends

However, such changes are usually impractical as an immediate control measure when trouble occurs during a seasonal pack, and temporary expedients are necessary to reduce the difficulty at least to a commercially acceptable level.

In attempting to correct problems of container detinning, the usual approach is to (1) reduce the alkalinity of the boiler water, and (2) reduce, in so far as possible, the carryover of boiler water in the steam. Methods of correcting these conditions will be discussed in the papers to follow. Where detinning or enamel removal is traced to those cans which are submerged in an alkaline condensate in the bottom of the retort, correction of the trouble may also involve removal of the condensate by bleeding the retort from the bottom during the process. If a water cushion in the retort is needed as an aid in pressure cooling, the bottom crate should be supported so that all cans are above the liquid level.

The formation of white deposits of boiler water solids on cans during the process may usually be controlled by treating the boiler water to reduce the solids, and by proper attention to boiler operation. In one instance a heavy white deposit on the cans was traced to one bank of retorts (used only during periods of heavy production) in which the steam header contained a heavy accumulation of boiler water solids which were carried into the retort by the force of the flowing steam. This difficulty was corrected by periodic "blowing out" of the steam lines involved, so as to prevent entrance of the accumulated solids into the retorts.

While the foregoing corrective procedures have proven helpful in some instances, the canner should recognize that, in many cases, the conditions mentioned are only the manifestations of inadequate boiler capacity. Where the true problem is one of overloaded boilers, temporary control measures may be expected to produce only temporary relief.

Boiler Water Treatment Methods To Avoid Carryover

By Charles J. Schafer,
of W. H. and L. D. Betz,
chemical engineers

The terms entrapment, entrainment and carryover are used to describe the condition of steam when it contains an objectionable quantity of boiler water solids. The terms foaming and priming are sometimes used to distinguish different types of carryover. Priming is generally considered as a more violent type of action in which the steam will contain slugs or fairly large quantities of boiler water. Priming is the type of condition which can occur when water level in the boiler rises to the steam discharge nozzle. Foaming is the condition resulting from formation of bubbles on the surface of the boiler water. The foam may entirely fill the steam space of the boiler or may be only of several inches depth.

Carryover is of importance in the operation of a cannery, since it can cause a number of difficulties. Condensed steam in the absence of objectionable carryover will have a pH slightly below 7, due to the presence of carbon dioxide. Such condensed steam is only mildly corrosive to a tinplated surface for the usual period of time that tin cans are processed. When objectionable carryover is taking place, the condensed steam will have a pH which may be considerably higher than 8.3. As a result, the condensed steam will be strongly alkaline and corrosive to metals such as aluminum, zinc and tin. The corrosive action is indicated by etching and discoloration of the tin surface after completion of processing. Rusting of the cans can then take place readily, particularly after storage in a humid atmosphere.

Carryover can also cause deposits in steam lines which will interfere with the operation of valves and steam traps. In plants which produce superheated steam for power generation, carryover can cause deposits in superheater tubes which will lead to failure of the tubes. Figure I illustrates a superheater tube deposit caused by carryover. The deposit was found after tube failure had taken place. Carryover can also cause turbine deposits which will seriously reduce operating efficiency.

In plants which operate at pressures above 400 psi and which also operate turbines, difficulty may be encountered with silica carryover. This problem is caused by the apparent vaporization of silica from the boiler water and is a problem which is distinct from the general carryover of all boiler water solids. It will not be discussed further, since most canneries do not generate steam at pressures above 400 psi.

FIGURE I

Carryover Deposit in a Superheater Tube

Normal Carryover

A small amount of carryover is common to the operation of every boiler and is designated as normal carryover. This is the amount of carryover which is permitted by the performance guarantee of the boiler manufacturer. Such guarantees describe the maximum amount of carryover as either one part per million or a similar figure or will describe carryover in terms of steam quality. When the guarantee is based upon steam quality, certain other conditions relating to boiler water conditions are specified. A guarantee based on quality only may permit up to 17.5 ppm of boiler water solids in the steam for operating pressures in the range of "zero" to 300 psi. Table 1 outlines the specification for maximum boiler water solids as given in the Standard Guarantee of the American Boiler Manufacturers Association.

Table 1

Operating Pressure, psig	Total Solids, ppm
0-300	3500
301-450	3000
451-600	2500
601-750	2000
751-900	1500
901-1000	1250
1001-1500	1000

The guarantee based on steam quality is the type which will usually apply to fire tube boilers in general and to water tube boilers which do not contain any steam drum internals for steam separation and purification. When the boiler guarantee specifies a small and definite limitation on steam impurity such as one part per million, the boiler will usually be equipped with internal devices for steam purification.

Causes of Carryover

Carryover may be due to both mechanical and chemical causes. The mechanical causes of carryover include high water level, load characteristics and lack of steam drum internals or leakage of the internals. For example, high water level can be encountered in boilers which are not equipped with automatic feedwater regulators or in which the feedwater regulators are not adequate for load characteristics. The chemical causes of carryover include high total solids content of the boiler water, high suspended solids, high alkalinities and the presence of materials which can promote foam formation such as animal oils.

In any plant in which carryover is being encountered, there should be a careful appraisal of possible mechanical causes of carryover. If possible, these should be corrected. Such correction may require the installation of feedwater regulators or a change in the type of feedwater regulator. In some cases it may be necessary to in-

stall other automatic equipment to regulate the load on the boiler plant. In extreme cases, the installation of additional boiler capacity may be required.

In plants where carryover is taking place primarily from chemical causes, the conditions which cause carryover will frequently cause other operating difficulties. Such difficulties may include scale formation, corrosion in the condensate system or caustic metal embrittlement of the boiler. Again, it is necessary to make a careful appraisal of the problem and future operating requirements for the plant to decide whether the installation of external water treating equipment is necessary. Within certain limits, it is frequently possible to prevent operating difficulties by the use of suitable internal chemical treatment only.

Prevention of Carryover

The requirements for external water treatment equipment will vary widely depending upon chemical and physical characteristics of the water which is used as boiler makeup. Natural water sources vary widely in characteristics and it is for this reason that there are many different types of equipment used. For example, clarification is desirable when the raw water contains suspended solids in the form of silt and organic matter. Sodium zeolite softening will remove hardness producing salts such as calcium and magnesium but will not have any effect upon silica. Acid-regenerated zeolites can be used to remove hardness and alkalinity. If the raw water is high in suspended solids, clarification is required ahead of the zeolites.

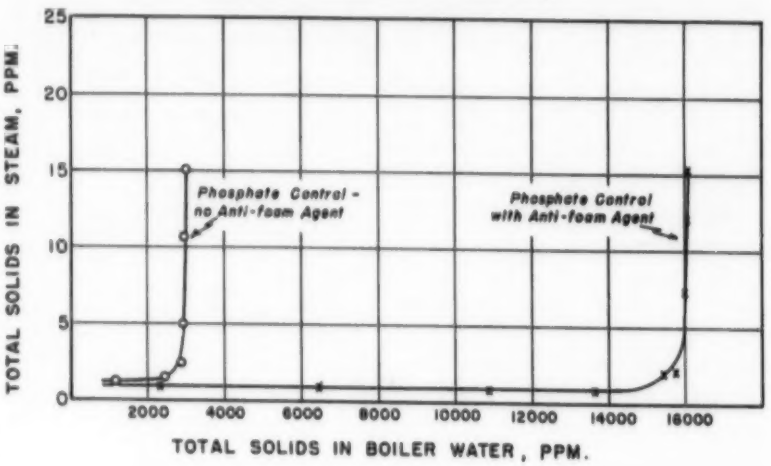
Cold or hot process softeners of the sedimentation type will reduce hardness, alkalinity and silica. With suitable water characteristics such reduction can be obtained at very low operating costs for treatment chemicals. Additional methods of external water treatment include demineralization and evaporation. For example, if sea water should represent the only available water source, it would be essential to install evaporators ahead of the boilers.

In a plant operating steam engines or steam pumps, the condensed steam is likely to be contaminated with material such as animal oil. Under the conditions of temperature and alkalinity in boiler water, animal oil will form foam-producing agents. Oil removal equipment can be employed to reduce the oil content of condensate to very low values.

The installation of external water treating equipment will usually involve a sizable capital investment. For this reason, it may be possible to save a considerable amount of money by having the problem evaluated by a water conditioning consultant. The problem should be investigated for future requirements of the plant as well as for the immediate problem. Any future plans for increased operating pressure or increased capacity should be taken into consideration.

FIGURE II

Comparative Test Results on Steam Purity



Carryover alone is rarely the only boiler water problem encountered. Probably the most common operating difficulty is the formation of scale or adherent sludge on boiler heat transfer surfaces. It is for this reason that some form of phosphate is employed in most boiler plants to reduce difficulty with scale and sludge formation. Many plants have also found that the use of phosphate alone will increase rather than decrease their carryover problem. Internal treatment of the boiler water should therefore be undertaken as a complete problem and not considered as a group of unrelated difficulties.

Foam Control

Highly effective organic anti-foam agents have been developed in recent years as a result of considerable research. The most effective agents have a somewhat complicated chemical structure and slight alterations in that structure make considerable changes in their ability to control boiler water foaming. In general, the polymerized esters, alcohols and amides are the most effective agents developed to date. Some of these agents, such as the alkaline polyamides, are substantially water insoluble and must be dispersed with other agents for convenience in feeding. An example of the results which can be obtained with the use of chemical anti-foam agents is illustrated in Figure II. This figure illustrates the results obtained on the same boiler. In one case an anti-foam agent was used while in the other case none was used. Without an anti-foam agent objectionable carryover took place when total solids in the boiler water reached approximately 3000 ppm. With the use of an anti-foam agent boiler water solids could be carried to nearly 16,000 ppm before objectionable carryover took place.

Anti-foam agents must be applied with an understanding of their limitations. For example, it would be possible in many cases to operate boilers at very high concentrations of solids without objectionable carryover. From a practical standpoint, such operation would not be advisable since the concentrations may be far in excess of the quantity permissible from the standpoint of maintaining clean internal surfaces in the boiler. The use of an anti-foam agent may permit the operation of a boiler with exceptionally high alkalinity in the makeup water and prevent the alkalinity from causing carryover. Such a condition may not be desirable from the viewpoint that the high alkalinity in the feedwater may cause excessive corrosion of condensate piping or may cause the boiler water to have embrittling characteristics.

Many boiler plants have been able to obtain reasonably satisfactory results in scale prevention with shot feed of the internal treatment chemicals. In some cases the application of anti-foam agents will produce the desired results with shot feeding and in other cases results are not satisfactory. As a general principle, the best results with any internal treatment chemicals, including anti-foam agents, will be obtained when the boilers are operated with both continuous chemical feed and continuous blowdown. Most modern boilers can be obtained with the necessary connections installed by the manufacturer. In older boilers, the necessary connec-

tions can usually be made by plant personnel.

Measurement of Steam Purity

A discussion of boiler water carryover would not be complete without giving some consideration to the methods available for detecting and measuring carryover. The basic method of measuring solids in steam is by gravimetric determination. In this procedure it is necessary to evaporate relatively large quantities of condensed steam in order to weigh the residue. It is understandable that the procedure requires a trained and skillful analyst and that each determination requires considerable time for completion. An alternate and usually preferred method is measurement of specific conductance.

Specific conductance is a measurement of the electrical conductivity of water. It serves as an indirect method of measuring the total solids content of the water. Specific conductance will not measure suspended solids or organic materials which do not ionize, or ionize to only a very limited extent. However, such solids will almost always represent only a small portion of solids present in the boiler water. The principal proportion of solids in the boiler water are inorganic salts which ionize to a considerable degree particularly at the low concentrations being measured in condensed steam. It has been demonstrated that within the limits of measurement which are of significance to boiler operation, the concentration of dissolved salts in water is directly proportional to specific conductance.

Simple and rugged equipment has been developed which will measure the specific conductance of condensed steam and condensate as well as that of boiler water. Such equipment can be used for checking spot samples or can be installed to make continuous measurement. If the measurement is of a continuous nature, the values can be recorded or can simply be used to operate warning devices to indicate when objectionable carryover is taking place.

In using conductivity equipment, it is necessary to obtain representative sampling of the steam or condensate. In sampling steam, a nozzle should be used, following for example, the design recommended by the A.S.M.E. For taking spot samples, a simple cooling coil is sufficient. If a continuous record of conductivity is to be made, then a condenser which will eliminate nearly all of the carbon dioxide and ammonia from the steam should be used. A certain amount of carbon dioxide and ammonia will be present in the condensed steam from most plants. In solution, these gases contribute some conductivity to the condensed steam which is not due to carryover. It is therefore necessary either to eliminate the gases before making the conductivity measurement or to make a suitable correction by analyzing for the amount of carbon dioxide and ammonia present.

From the preceding discussion, it can be seen that there are a number of possible solutions to carryover problems. The solution to be selected for any particular plant will depend upon a number of things including cost, interruption of operation and length of time to make the necessary changes. The use of chemical anti-foam agents will frequently provide a permanent solution to many carryover problems.

Boiler Operation to Control Water Carryover

By F. L. Blumenshine,
California Packing Corporation

Cannery boiler installations range from good sized batteries of water tube boilers to a single little vertical fire tube. We can deal here only with basic operating principles and equipment that, generally speaking, apply to all.

We shall also try to contain our remarks so that they apply only to the one phase of boiler operation—"Control of Water Carryover."

The term "water carryover" seems sufficiently descriptive so that we need not define it further. The mere fact that water is carried over into steam lines from boilers would probably not alarm us too much, if it were not for the fact that such carryover water sometimes contains alkaline contents which, as has been explained in the previous talks, attacks the tin plate of our cans or leaves unsightly deposits.

Causes of Carryover

Possibly two conditions might be listed which are most frequently the cause of carryover: (1) foaming and (2) priming or surging.

Foaming is the formation of a foam of steam bubbles on the water surface in the boiler. It is a surface condition, and the foam may completely fill the steam space, leading to the carryover of the foam itself and moisture into the steam lines. In the simplest of terms, it is caused by impurities in the water. These impurities may be oil, chemical ingredients of the water, or extraneous substances.

Some measures that can be taken to prevent foaming are:

(1) Installation of adequate oil separating equipment, if boiler feed water contains any oil,

(2) Treatment of boiler feed water,

(3) Increasing frequency and duration of boiler blowdowns, or

(4) Installation of continuous boiler blowdown systems.

It is unlikely that many are bothered with oil contamination of boiler feed water, but where it does occur it can lead to serious foaming.

Many reputable companies can supply treatment for boiler water and we would recommend a treatment especially tailored for your particular water. Various "cure alls" have been peddled over the years, but generally speaking, they have not given full satisfaction. Furthermore, make sure that the treatment you procure will have no deleterious effect on your canned product, should there be an inadvertent carryover with your process steam. It might be mentioned here that the use of straight zeolite-softened water for boiler makeup, a practice which many canners have followed in the past for scale prevention, is an invitation to foaming, and especially so if you are making undue demands on the boiler or boilers. Experience has proven that by modifying the zeolite-softened water (adding hard water), to a point where you are getting a slight scale formation, the foaming can sometimes be controlled or minimized.

Increasing of blowdowns will in some instances eliminate foaming as it reduces the solids; this has the added advantage of reducing the alkalinity of the boiler water. A continuous blowdown system is highly desirable, inasmuch as it has the effect of reducing dissolved and suspended solids continuously, thus lessening possibilities of buildup and foaming. With such systems, regular blowdowns are reduced materially; this effects a considerable operating economy. I would like to emphasize here that such systems only reduce the number of regular blowdowns. We must get rid of sludge by regular blowdown. Simple systems can be installed at very nominal cost—the more elaborate, the more the cost.

Priming or surging is the violent ebulition of the water within the boiler, in which slugs of water are intermittently carried out with the steam.

This condition may arise from numerous causes, such as:

(1) Boiler design

(2) Overloads

(3) Incorrect and varying water level in boiler

(4) Undersized steam mains

(5) Sudden and violent steam demands.

Peculiarities of design cause some boilers, when a material evaporative increase is demanded, to produce an unusual turbulence, which enhances possibilities of priming or surging. It

is sometimes possible to install baffles to minimize such turbulence.

Overload problems, of course, can generally be handled in only two ways: (1) by reduction of overload or (2) by adding additional boiler capacity. The first is generally impossible in our canning plants where production has overtaken steam generating capacity. The second is costly and with a short seasonal operation, such as many canners have, the additional investment cannot be fully justified. In such instances a thorough survey of existing facilities should be made. Boilers, depending upon their type, are constructed to deliver up to as much as 200 percent of their rated capacities. By making not too costly equipment changes, and revising and coordinating operating practices, a considerable generating capacity increase can be obtained.

As nearly as possible constant water level is an important factor for good boiler operation and minimizing of priming. Automatic equipment, if it can be justified, will generally give very satisfactory results.

Steam mains that were previously very ample, but because of increased steam demand now, are causing such increased velocities in the steam leaving your boilers, that they literally suck the water from them—are as may be imagined, a very potent cause of priming. Increasing size of your mains leaving boilers can be one of the equipment additions you can make and expect to get the most benefit from, if priming is one of your troubles.

It takes no unusual imagination to picture what takes place in a boiler, operating at considerably above its rating, and with its outgoing steam mains the very allowable minimum in diameter—when your retort room slaps on a couple of retorts simultaneously, your syrup man starts heating up a couple of tanks of syrup and about three blancher temperature controls suddenly call for full steam supply. Is it any wonder you get priming? The remedy, of course, lies in management's hands.

Traps and Drip Legs

We have mentioned steam mains as concerns diameter and carrying capacity. Possibly we should pursue this subject still further out into the factory proper. All steam mains should be adequately trapped at frequent points to take care of condensate. Where water carryover occurs it helps many times to install drip legs. If placed judiciously, where steam mains change elevation or direction, they will collect a major portion of your solids which tend to travel along the bottom of your mains. Such legs should be trapped at a reasonable distance above their lower end and fitted with a direct blow through valve at the bottom. At one of our plants where we were experiencing some detinning marking of cans, we collected in such drip legs carryover material having a pH over 12.

Steam feed mains in retort rooms should be given special attention where carryover from boilers is causing detinning or white deposits on cans. Each main feeder line should be fitted with drip leg and trap at its lowest end. All leads to retorts should be taken from the top of feeder main. This is a very important point in combatting such troubles.

An important factor in all boiler operation, but especially as concerns control of foaming and priming, is boiler room personnel. An alert, well posted and conscientious boiler room crew can do much to minimize trouble. To meet the varying boiler loads experienced in most canning plants requires constant and intelligent attention to fuel supply, proper draft regulation or control of air supply, water level in boiler and proper timing of cleaning fires, if coal happens to be the fuel. Blowdown schedules must be adhered to strictly and all records kept up to date and accurately.

In the foregoing we discussed our subject principally from the standpoint of existing equipment. It goes without saying that if an entirely new boiler installation is contemplated, all points we have mentioned should be thoroughly considered.

Cannery Steam Requirements

By J. H. Beck and Lawrence Newsome, Continental Can Company

Since the inception of commercial canning, steam has been the principal medium of heat transfer for the preparation and sterilization of canned food products. In the last few years other means of heat treatment, like radio frequency, induction and infrared heating for preparation, and cold sterilization by ionizing radiation have been under investigation. Such investigations have generally resulted, however, in methods and procedures which cannot economically compete with steam for the purposes mentioned. There is, therefore, no doubt that steam will continue to be the most acceptable means of heat transfer for many years to come. This competition, however, increases the necessity for emphasis on the efficient production and use of steam in the canning industry. It is important therefore, that an adequate supply of steam suitable to the needs of the various operations be available at the time at which it is required.

Properties of Steam Supply

Steam at pressures consistent with the needs of the various unit operations is necessary if the operations are to be carried out efficiently or even satisfactorily. In general, line pressure of 100 to 125 psi are adequate for most operations if the boiler is properly sized and if the steam lines to the various units are adequate to carry the amount of steam required. Attempts to operate at pressures substantially under these figures usually result in questionable practices or inefficient operation. The retorting operation is particularly vulnerable, as it is almost impossible to accomplish adequate venting at pressures under 70 psi unless exceptionally large and expensive lines are installed.

"Pure" steam, that is, steam free of air or other noncondensable gasses, condensable volatile materials other than steam, excess condensate, and entrained solubles such as boiler compounds and salts, is necessary to preclude the possibility of faulty retort operation, contamination of the products involved and corrosion or other damage to the container. While it is extremely unlikely that any steam supply would carry enough air or other gasses to affect the efficiency of a thermal process, some steam supplies may become sources of product contamination when they carry certain volatiles, excess condensate or soluble materials carried in entrained boiler water.

Soluble corrosive materials carried from boilers in entrained condensate are all too often responsible for container corrosion, discoloration and damage to outside enamels or lithography during retorting. The presence of these materials is usually due to faulty practices in boiler operation such as excessive use of boiler compounds, high concentrations of salts in the boiler water and high water levels. All of these practices are conducive to "priming," the main cause of liquid carryover. Periodic draining and flushing of all steam lines with fresh water will usually prevent an accumulation of corrosive materials which may have been carried over into the steam lines.

Steam Production

Boiler or steam generator capacities are often listed in terms of boiler horsepower. This value may be defined in terms of the ability of the unit to change approximately 34 pounds of water at 212° F. to steam at 212° F. It has been common practice to rate a boiler on the basis of 10

square feet of heating surface per boiler horsepower. With improved firing methods it was found that a boiler could develop considerably more than "rated capacity." The rating of boiler horsepower according to heating surface has therefore become obsolete, although it is still used occasionally with reference to standardized boilers of lower capacity. The most common term used today is the number of pounds of steam per hour that the boiler will produce under a specified set of conditions.

Steam generation equipment may be classified into two general types, firetube and watertube boilers. These in turn may be obtained in several different styles. The firetube type either in the horizontal return tubular or Scotch marine styles are the most commonly used, particularly in seasonal operations and primarily because of its lower initial cost. The firetube type is generally operated at rather low pressures usually not over 150 psi. The watertube type is usually used in larger installations involving year-round operations and where large amounts of steam are required and where very high boiler pressures can be used. Either type may be operated at something over their nominal rated capacities, the degree of overload depending upon design, setting, fuel and other factors. One advantage of firetube boilers is the large water storage capacity. Because of this feature, wide and sudden fluctuations in steam demand are met with little change in pressure. Watertube units on the other hand are capable of considerably higher overloads both continuous and intermittent. The knowledge that boilers can be operated in excess of rated capacity quite often results in an installation that is undersized, as too much faith is placed in the possible overload and not enough consideration is given to loss of efficiency over extended use, and expansion of operations. Undersizing may occur where steam "generators" or "package" units are used since in general they are compactly constructed for limited space requirements and ease of installation, but usually with no provision for overloads in excess of rated steam production capacity. However, there are some self-contained boiler units designed to provide for considerable overload capacity.

Fuel is an important consideration in selecting a boiler. The choice of fuel usually resolves itself into a matter of economics and no general rule appears to be applicable for all localities. In some circumstances a change in fuel and/or firing method can increase steam output. Oil and gas firing systems require less attention and maintenance and are cleaner than most coal fired installations. Gas is preferable to either oil or coal if the cost permits, since there is no problem of storage or waste disposal.

Another problem is that of single versus multiple installations. This question almost always arises whenever new steam plants are being considered. This will require careful analysis of the intended operations particularly with respect to possible demand variations. Usually if over 6,000 pounds of steam per hour are required to handle peak demands, with very low off-season demands, multiple installations should be considered. If a boiler should fail in the case of dual installations, it is usually possible to operate with one boiler until the failure is rectified. This usually requires very careful juggling of certain operations, but it can minimize the losses which may result from a complete shutdown.

A careful analysis of the cannery steam requirement and the operating requirements of individual units by competent personnel is necessary to ensure the selection and installation of a steam plant which will most efficiently supply an adequate amount of steam, at the time needed. A well engineered steam plant can contribute much in reducing production costs.

Consumption Demand

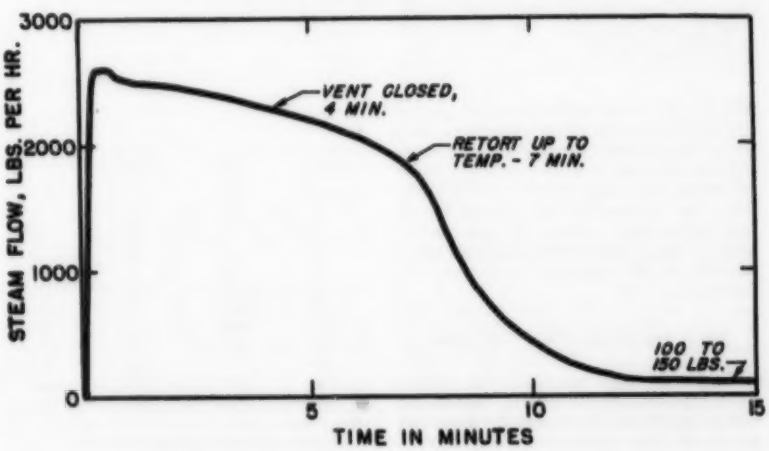
In determining the size or capacity of boiler installations, one must give consideration principally to the peak demands of various operations and with respect to the number and frequency of occurrence of these peak demands. These peaks may differ greatly from operating demands and it is imperative that an adequate steam supply be available to preclude the possibility of affecting the efficiency of other operations which may be going on at the time of peak demands. Besides having ample boiler capacities, steam lines adequate for the peak demands of the various operations must be installed and with proper insulation to protect against undue amounts of condensation.

The installation of steam traps where possible will help in reducing the demands on boilers since they allow for utilization of all the potential heat in the steam. It is very important that traps be properly sized to insure adequate condensate removal.

Probably the best example of the wide variance between the peak demand and operating demand is in the retorting operation. Peak demands for retorting occur during the venting period when the air is being expelled from the retort. At this time the peak may vary between 2,500 and 6,000 pounds per hour for a standard three or four crate retort, depending upon the size of the steam inlet line. Peaks for 1-inch inlets will reach a rate of approximately 2,500 pounds, 1¼-inch 3,500 pounds, 1½-inch 4,500 pounds, and 2-inch approximately 6,000 pounds per hour. Roughly one-fourth to one-half of the total steam required per charge is used during the venting period and will vary depending on the venting cycle required for each installation. The peak demand drops off rapidly to an operating demand of 100 to 150 pounds per hour after the vent valve is closed and the retort reaches operating temperature (Figure I). The average steam consumption for a full three or four crate retort for processes up to 60 minutes will vary from 250 to 300 pounds of steam or approximately 6 pounds of

FIGURE I

Typical Steam Consumption Curve for Retorting



steam per case of 24 No. 2 cans. There is no significant difference in the requirements of three and four crate retorts or between hot and cold retorts. Because of the high peak demands for individual retort come-up, care must be exercised in timing these operations in order to prevent undue demands upon the steam generating system. Unless the system is over-burdened by regular operating demands, an efficient generator will usually recover after such demands with no appreciable pressure drop at the boiler. In order to minimize the effect of pressure drops in boilers operating at near peak capacity, it is sometimes desirable to install a reducing valve in the boiler header thus allowing the boiler to be operated at something greater than line pressure. This acts as a reserve steam supply.

Other equipment such as blanchers may have rather high peak demands at the start when it is necessary to heat up a sizable amount of water to blanching temperature. Peaks of this nature offer no problem as they are usually met before actual plant operations start.

Steam Requirements of Products

The following steam consumption values are based on actual flow meter measurements made in canneries during normal operations. All values are expressed in pounds of steam per case of product.

Table 1

Product	Pounds of Steam Per Case		
	Preparation	Retorting	Total
Asparagus Cuts, No. 2's... Cannery A	16	7.8	23.8
Asparagus Cuts, No. 2's... Cannery B	13	5.1	18.1
Asparagus Cuts, No. 10's.. Cannery B	17.2	6.7	23.9
Corn, whole grain in brine, No. 2's.....	3	6.3	9.3
Corn, cream style, No. 2's.	10	6.6	16.6
Peas, No. 2's.....	8.3	6.5	14.8
Apple Slices, No. 10's.....	....	...	32
Applesauce, No. 10's.....	....	...	20

The steam consumption values listed above for the retorting operations are quite consistent for the products involved, with an average of 6.5 pounds of steam per case of 24 No. 2 cans. This has proven to be a good figure for estimating steam requirements and is also consistent with the total of 250 to 300 pounds of steam per retort.

Steam Requirements—Unit Operations

Table 2 lists approximate steam consumption requirements based on either measured or reported values for some of the more significant unit operations. All values are expressed in pounds of steam per hour with averages based on a case of 24 No. 2's or as otherwise indicated.

Table 2

Unit Operation	Peak Demand (lbs. per hour)	Operating Demand (lbs. per hour)	Av. lbs. steam used per case
Retort			
1-inch steam inlet.....	2500	100– 150	6.5
1¼-inch steam inlet.....	3500	100– 150	6.5
1½-inch steam inlet.....	4500	100– 150	6.5
2-inch steam inlet.....	6000	100– 150	6.5
Continuous pressure cooker....	6000	1000–1500	3.5–4.0
Open kettle (212°F.) processing 60 min.	2000	100– 200	2–5
Blancher, reel....	3000	1000	5–6
Blancher, tubular	3000	1200	5–6
Flash sterilizer T.J.–300./min.	950	750	1.8
Open kettle concentration tomato puree–1.045.....	6000	5000	49 (6–10's)
Brine heating (60 to 200°F.).....	....	.....	3
Double batch mixer, cream style corn.....	1800	750	3
Exhaust box, steam(4' x 20').	500	500	3 (6–10's)

Once unit demands are determined, a complete analysis of the various operations must be made with respect to the occurrence and timing of these demands. With this information available, it is a relatively simple matter to sum up all of the peak and operating demands which occur at any given time, and the highest figure will then be the maximum demand for the operation. From this requirement the steam generating and distribution systems can then be determined. At this point engineering assistance should be obtained to review the consumption data, determine the best type of boiler and fuel to be used, and to plan an adequate distribution system. Some consideration should also be given to possible future expansion of canning operations so that provisions can be made for additions to the steam plant. All too often installations are made with no consideration of future needs. Too much consideration may be given to utilizing all possible capacities from overload with the mistaken thought that the cost of the next size boiler would be prohibitive. This may result in inadequate steam supplies and expanded production costs. It is far better to play safe and oversize the steam plant.

Estimation of Steam Requirements

In estimating steam consumption requirements for a cannery, knowledge of the demands, both peak and operating, for each individual piece of equipment using steam is important. If this information is not available some means of estimating these demands is necessary. The heaviest demands usually occur during retorting operations particularly during retort come-up. This is especially significant if two or more retorts are coming up at the same time. Continuous processing systems tend to eliminate excessively high peak demands, thereby resulting in a lower boiler rating requirement.

Table 3 lists the approximate flow of steam at various line pressures through several size orifices discharging directly to atmospheric pressure. All flows are listed in pounds per hour. This table may be used for estimating the steam requirements for non-standard operations such as exhausting, blanching and direct steam injection heating. From the size and number of holes from which steam discharges in the equipment and knowing the line pressure, peak demands may be estimated. The same tables can be applied to ⅛ to 1-inch steam supply lines to various units if the line is relatively short.

Table 3

Flow of Steam Through an Orifice

Steam Pressure psi gage	Size of Orifice						
	1/8 in. (.01227 sq. in.)	3/16 in. (.02671 sq. in.)	1/4 in. (.049 sq. in.)	3/8 in. (.110 sq. in.)	1/2 in. (.19635 sq. in.)	3/4 in. (.4418 sq. in.)	1 inch (.7854 sq. in.)
5	7	20	38	80	145	315	580
10	10	30	52	120	216	480	850
20	14	40	76	175	316	690	1230
30	20	50	100	215	384	840	1510
40	26	60	125	260	450	980	1780
50	33	70	150	300	520	1125	2050
60	38	85	175	345	590	1270	2330
70	44	95	200	390	660	1415	2600
80	50	105	225	430	730	1560	2880
90	56	115	250	475	800	1700	3170
100	61	130	275	520	870	1850	3450

Steam flow given in pounds per hour.

FILLING OPERATIONS IN CANNING

Filling Liquid Products

By E. McKinley,
Chisholm-Ryder Co., Inc.

The machine manufacturers' problems come under four general headings in the building of liquid fillers. These are: fill control, cam transfer to the seamer, sanitation, and lubrication.

Taking these in their order of importance, we'll start with fill control, under which we have the problem of aeration, bowl level, temperature, speed, displacement.

Under displacement we have four types that we shall call the positive, or plug, type; the air displacement; measured amount; and vacuum filler.

Foaming is the indication of air in the product, and this air in the product will produce aeration and affect fill. But the fact that aerating equipment is present in the line does not necessarily indicate that air does not exist in the product. It's a well-known fact that leaky pumps and leaky lines following the deaeration equipment will undo all the work of the deaerator, to the end that the product as it reaches the filler may have more air in it, whipped in by the pump, than when it entered the deaerator.

This is a problem that cannot be controlled by the filler manufacturer but is of such major importance that it is his problem to determine whether or not efficient deaeration is taking place and, if not, that he provide the best possible means to overcome it.

There are moderate cases of aeration that the filler manufacturer can meet by furnishing the proper displacement plugs, adjustable vent rods, adjustable valves in the case of air displacement, or varying the thickness of the valve pads in the case of vacuum fillers.

It has been found to be a fact that a product that has been allowed to stand, let's say, 15 minutes in a holding tank, will result in a heavier fill than one that has been run almost direct through the line without any standing time, because this holding has allowed the entrapped air to gradually escape.

There are plenty of canners that do not deaerate their product, so our remarks should not be construed that deaerating equipment must absolutely be used before filling. But it certainly does help to obtain a better fill and a better product.

Aeration in the product can also result in an unexpected contamination in that the foam in the bowl will stay there for hours on end that can result in contamination. Where such foaming exists, manufacturers strongly recommend a bowl cover to exclude the air as much as possible.

The next major fill control problem is that of controlling the level of the liquid in the bowl. And the greatest advance that has been made in this direction in recent years has been the air operated type of level control that will hold the level consistent within ¼ inch.

To make a comparison, we must go back to the old butterfly type of valve that will allow a variation of 2 to 3 inches in level, and I don't need to tell you what this does to the fill because such head or pressure variations seriously affect the amount of juice in the vent tubes in the case of those types that use vent tubes. There are fillers available that have adjustable vent tubes that will counteract this variation in level control to a limited extent, but this should be controlled by a proper liquid level control to start with.

Now we come to the matter of temperature; and any high school student knows that if we heat a product it expands and that when we cool it, it's going to contract. In order to have a consistent quantity at the cooled temperature, we must have a consistent temperature at the point at which the product is put into the can.

Variations in speed of filling can influence the fill just as greatly as variations in bowl level. If you were to operate a liquid filler at, let's say, 200 cpm, and then reduce the speed to 150 cpm because of lack of material, you'll have an increase of filling time that results in a longer time that the valve is open and which, in turn, will allow more escapement of any entrapped air; so that you'll wind up with more ounces in the can, and we can't get away from some entrapped air regardless of how well we try to deaerate.

If we had such a thing as perfect deaeration and temperature control, we could fit the can to the exact contents desired and we could, theoretically, fill it to the overflow point. But there are reasons for having what we commonly know as a headspace. One of these is the fact that we can never attain perfect deaeration. And the second reason is that by having a headspace we have a certain leeway to overcome spillage due to the motions that take place in the filling operation and the transfer that must be effected to the filler.

Displacement is accomplished in one of four ways: the positive displacement plug, air displacement, measured amount, and the vacuum type of filling.

Each will provide that a certain predetermined space will be left in the fill of the can to overcome the problems that I have mentioned. And all of these methods have been proven effectual according to the designs of the fillers put out by the various manufacturers.

Now we come to the very acute problem of transferring the filled can from the filler to the sealer. And at this point I don't want to appear to be passing any bucks to the various closing machine manufacturers because it is a problem that is common to both of us, and I will say that all of the seamer people have been very cooperative in trying to obtain as near as possible the perfect transfer.

Nontheless, this is a very real problem and, due to the differences in centers that exist in the seamers, one that is very difficult for the filler people to meet. Without referring to the various models of seamers that are commonly used, we can tell you that we have a variation of centers that range from 5¼ to 6¾ inches. And you can very readily see why the filler manufacturer cannot build his fillers on the basis of center-to-center, which is considered to be the ideal.

We're not going into all the variations of can transfers but will consider only the one that is used the most today in high-speed lines—that of the transfer to the in-line closing machine. To meet these variations in the seamer centers we must vary our can gauges to accelerate or decelerate the travel of the can in the course of transfer. But we do know that spillage is caused more by deceleration than acceleration. To meet all of the centers in all of the seamers being used, we must still at times decelerate, because we filler manufacturers must arrive at a happy medium for there are also problems in too much acceleration.

To build fillers to match the centers of each type of closing machine would make the cost of the fillers prohibitive.

One of the other angles, but still important, is the matter of dented can lips or flanges that result in cutting the valve rubbers on some types of fillers. This becomes very serious in the case of the air displacement type, in that such dents allow the escape of the air that is meant to create the displacement.

Another factor is that the supply line should be such as to deliver the juice beneath the liquid level in the filler bowl to avoid aeration and should be located so that an even distribution is obtained.

Coming back to our major headings, we have the very real problem of sanitation. And this means just one thing: How to clean the machine effectively so that there can be no bacteria buildup and no product left in the valves or anywhere in the machine. Most of the filler manufacturers have overcome this problem by constructing their fillers so that at the end of the day's operations the valves can be easily cleaned without

removing. Human nature being what it is, the machine construction must be such that the laziest operator cannot find an excuse for his filler not being kept clean and sanitary.

I am not going to dwell on the subject of lubrication except as it affects the operation of the machine. We manufacturers know that gears must be properly fitted and wherever possible run in oil or grease because improper gears will result in that jerking motion that causes poor can transfer and consequent spillage. To every possible extent, gears and moving parts should be protected from the corrosive effects of the product. We are happy to say that we have paid particular attention to this matter of lubrication to the end that it does not exist as a problem today.

In closing, I want to dwell just for a moment on a problem that really doesn't belong to the filler but comes under the heading of the human element. And it's one of which our sales people are just as guilty as the customers. Too often we receive orders that lack the information that we should have to intelligently fit the filler to the job to be done. So I'm going to say to you as a customer that you should give the salesman every little bit of information as to the application of the filler that you're going to buy. And to the salesmen, I'm going to say that you should dig out of the customer everything that you think may be relevant to that filler's application. We all have engineering departments and they are there to give the best service possible to the customer. But those fellows usually have to look through your eyes and hear through your ears to know how to do the job.

Filling Liquid Products

By Ian MacPhail,
H. J. Heinz Company

The only liquid items filled by the H. J. Heinz Company are vinegar, worcestershire sauce and tomato juice. However, I would like to classify many of the other varieties we handle, such as soups and catsup, as liquid products. Usually when I think of volume filling and the problems involved, I think of the liquor industry and what I imagine must be a very closely controlled operation. However, their tolerances may not be any closer than our own and the cost of the ingredient—without tax—may not be very much different.

Some of those in the audience are filling equipment experts and I would like to say at the outset that the development improvement of some equipment has been most impressive; in some instances really spectacular. Possibly some of our experiences may be of interest to the equipment and supply people and we hope these remarks will also be of interest to our friends in the canning business.

We have problems and perhaps we can get the benefit of your experience, or better still, perhaps you have a satisfactory solution. I like to feel that the words "satisfactory solution" really refer to "temporary solution", because many of the filling problems today are settled after a fashion as of that particular date. I am sure many of us thought the filling machines and much of the other equipment used several years ago was the last word. The men engaged in machine design have certainly done a wonderful job and we are looking for new machinery to give us even better performance.

Perhaps we should elaborate a little on this word "performance." By that I mean in addition to fast operating speeds, cleanliness during operation, ease of cleaning, noncorrosive, maintenance as simply as possible and an exact filling operation. I think we must put more stress on this feature of exact filling. The high cost of ingredients, high labor cost and the large amount of equipment required to prepare the ingredients for filling make it imperative that the product be filled in a very exact manner. This ingredient cost item is getting more and more attention, at least in our business and in the food business, generally; it can be a make-or-break proposition. The current filling speeds and the production volume of most varieties make this so important. The overfill or material given away is a most important fringe benefit in the canning industry.

At the present time we are giving more thought to small amounts per package and it may be of some interest to comment regarding these so-called small amounts. I think you will agree that in some operations it would be possible to save ⅛ ounce per package. For some items, such as catsup and figured on the basis of 1,000,000 bottles, this slight reduction in weight would save enough material to fill approximately an additional 9,000 bottles of 14 ounces each. That is more than half a trailer load. Under these circumstances you would save approximately 9 tons of tomatoes and in addition sugar, salt, vinegar and spices. At today's cost figures, this is an appreciable amount. The point we want to emphasize is that in the final analysis we are not talking about small items. Actually, in the Heinz Company's case, the savings are considerable when you consider the total pack. I think you may be surprised when you actually examine your own records to find instances where more than ⅛ ounce per package can be saved on the average.

Speaking of this word "average" reminds me of a friend of mine who was interested in statistics. He had a very narrow escape from drowning. It seems he was trying to wade across a fairly large stream, which he figured was only four feet deep, on the average.

No doubt you can gather from my comments that a great deal of the success of a program of this nature is tied in with the supplies, such as containers and equipment. I would not want to infer that this is only a problem for the equipment industry, because some of the concerns represented here make some of their own containers, such as tin cans. At the present time we are working in our own can making department in order to try to determine where it might be possible to control certain can measurements by statistical control chart methods. We are very interested in the variations obtained and feel these not only have an important bearing on good efficient double seaming, but the measurements also have a bearing on volume filling.

In many instances volume filling is simply a container filled with product from the filling machine and the mixture or material is added as a single shot. When I refer to "shot" filling, I mean the amount of material or mixture added to each can or jar, as the container passes under a filling machine. In an operation such as chicken noodle soup, the noodles are added as one shot, the chicken is added as a second shot, and the broth can be referred to as a third shot. There are many instances in our business where two and three shot filling operations occur and incidentally this requires additional equipment. These mixed ingredients are added as volume items and are then checked by weight. Thus, the uniformity or quality of the product is related closely to the uniformity of these individual additions and the acceptance of a variety by the public may be influenced by this fact.

In filling some varieties of pickle products, we find that we obtain a more uniform flavor by first adding to the container a volume or "shot" of the spiced liquor. Then this is followed by the pickles.

From a production point of view and in addition to quality requirements, it is also necessary to have the proportion of mixtures at filling operations very closely controlled. This refers especially to the various two and three shot filling methods mentioned previously. If the volume added to the containers is not correct or if it varies considerably, there is too much of certain materials on hand and not enough of another to complete the operation. Naturally this affects the yield and cost of the product.

We had an interesting experience a little over a year ago, when working on a catsup filling problem. At that time we examined the records from

the glass testing departments and by grouping the volume results in the form of histograms, it was possible to show a trend over a period of time. This capactiy trend was toward increased volume, which was caused by machine mold wear. In this instance a large-volume operation was involved and, to be quite candid, we were not interested so much in the explanation of machine mold wear, but we were vitally interested in the problem of not allowing this upward trend in increased volume to occur. Let me say here that our glass suppliers recognized immediately the problem confronting us; they realized they could not use mold equipment quite so long for the manufacture of catsup glass and the over-all improvement was a cooperative effort. As a matter of fact, the discussions with our glass suppliers continued and later there was an additional improvement in the capacity specifications.

Some time ago there were criticisms within our organization that the appearance of beef stew was not as uniform as we wanted it. The stew consisted of beef, potatoes, carrots, gravy and spices, and this mixture was filled by machine to be followed later by the addition of broth. This is another example of a two-shot filling procedure and here again the occurrence of incorrect weights affects the quality from the standpoint of flavor and consistency and it also affects the yield.

Over a period of several hours, individual samples were taken at random direct from a filling machine before any weight adjustment was done by inspectors. It was found that the weights of stew delivered by the machine varied from a low of 5-5/16 ounces to a high of 7-11/16 ounces—a total spread or range of 2⅜ ounces. The standard weight of this material was supposed to be 6½ ounces. Kindly keep in mind this was the weight of the mixture only, before the inspectors had an opportunity to adjust the weights and before the addition of the final broth.

When this part of the work was completed, the point of testing was then moved to the other side of the inspectors. The samples now taken for weight check represented cans on their way to the broth filler, then the double seamer, and to perhaps the most important person in the world, the customer.

The inspectors did a surprisingly good job removing and adjusting the lower filled or lighter weight cans. In the first test direct from the filler, the average weight delivered was 6⅝ ounces; however, after the final adjustment by the inspectors, they had removed practically all the low filled cans. In doing so, the girls also increased the average weight of the stew mixture to 6⅞ ounces. In addition to the fact that the increased average weight represented an expensive ingredient, the total spread of weights from 6-3/16 ounces to 7-13/16 ounces was not satisfactory.

Since that time there has been definite improvement. The spread of weights is now from 6¼ ounces to 7 ounces with an average of 6-9/16 ounces. In addition to better uniformity, we have reduced the average weight by 5/16 ounce. This weight of expensive stew mixture represents approximately 5 percent of the material per can and in a single production run of 20,000 dozens, this ingredient saving is sufficient to fill an additional 950 dozens.

No doubt many of you are interested in television advertising, at least looking at it, many of which include statistical claims for the various brands represented. Sales are said to be 143 percent ahead of the nearest competitor, or seven out of nine use this product. Sometimes it makes you wonder how so many other concerns are able to stay in business supplying the small percentage remaining. Perhaps it's something like an advertisement I saw some time ago which described metal pails. Not being in the pail business, it seems to me a rather difficult thing to elaborate very much about them. However, according to the ad, these were without doubt the very best, the edge was smooth, the bale was the right shape and the metal would not corrode. Then as a final inducement the advertisement stated, "These are the biggest 10 quart pails on the market." So I think we must put more stress on the capacity specifications for containers and other equipment and I certainly do not refer to the average. The average weight or average capacity is only part of the story.

Perhaps we feel that the types of problems mentioned refer to United States factories only; however, I want to say that the necessary economy of operations is equally important in Canada. And their quality standards are equally important. Possibly some of you may not know that the labeling requirements in Canada are practically all according to liquid capacity or fluid ounce size. Needless to say, the Canadian containers must be filled properly as in this country, and in practically all instances I can think of the volume or fluid ounce filling requirements are checked by weight at the filling operations. The small tin 202 x 214 used for strained foods in Canada is labeled 4½ fluid ounce size and, as you know, this size can contains 4½ to 5¼ ounces by weight depending on the specific gravity of the contents. Nevertheless, the can is known and labeled as the 4½ fluid ounce size.

I feel that we keep coming back to the fact that the equipment and supplies used in the food industry constitute the most important feature of filling control. The fact that we are always looking for new equipment proves we are not exactly satisfied with what we have at present.

We have tried to cite some of the most important features in which we are specially interested:

High-speed filling, clean operation, no corrosion, comparatively simple mechanical features, easy to clean; and last, but by no means least, precision filling.

Fillers for Granular Products

By H. L. Link and H. Dobson, Food Machinery & Chemical Corp., Sprague Sells Division

A granular product as we know it in the food industry consists of discrete particles ranging in size from No. 1 peas and dry cereal grains on the small side up to particles as large as whole potatoes, peach halves and whole plums. Dimensionwise, these products range from ⅛-inch cubes up to units 2½ to 2¾-inch in diameter. As such, a granular product has little or no flow characteristics in the exact scientific definition of the term.

The granules may be dry such as dry beans, popcorn or rice, or they may be wet like sliced peaches, whole grain corn and a variety of diced or cut vegetables, fruit and meat products. Furthermore, it is a product that could be filled with a liquid or without a liquid. It is certainly a product which is not filled through a piston or a liquid-type valve.

Filling Machine Defined

Fillers required to handle these granular products are necessarily of a type described as measuring or volumetric.

There are two general classifications of volumetric fillers: "automatic" and "hand pack." The automatic fillers are generally used to handle the small granules or freer flowing particles such as peas, corn or diced vegetables. These are commonly known as the pea and bean fillers. The hand pack type of filler, although in some cases satisfactory for free-flowing particles, is generally used for filling large, irregular shaped products. The hand pack fillers are also especially useful for products that are too soft to be handled mechanically and automatically.

Measuring Pockets

There are three general classifications for volumetric measuring

pockets: telescopic, container, and compressible.

(1) *Telescopic Adjustable Measuring Pocket.* These may be round or rectangular in cross section and are actually assembled in a telescopic fashion, with one section within the other and adjustable to increase or decrease the volume.

(2) *Container as a Measuring Pocket.* The simplest of all measuring pockets is the container itself whether it be a can or a jar. For such products where headspace for the actual amount of the granules is not critical, this type of measuring is entirely satisfactory. Container measuring usually applies to a hand pack filling machine.

(3) *Compressible Type of Measuring Pocket.* This type of pocket generally consists of two segments which may be separated to form an elongated opening, and then after filling they are compressed to a smaller opening. This sequence permits the product to be filled easily and then compressed to a smaller volume so it can be transferred into the container. In the case of the compressible type of measuring pocket, the transfer from pocket to container is usually accomplished with some sort of pusher. These are very special machines initially designed to fill whole green beans.

Filling Hoppers

A variety of filling hoppers have been designed for granular products. The type of hopper required will depend entirely on the granular size and condition of the product such as wet, dry, soft, hard, etc.

There are two general classifications of hoppers: stationary or fixed hopper, and movable hopper.

Under the stationary classification, we have several variations such as the round, funnel-shaped hopper or oblong or oval-shaped hopper.

Either of these hoppers may be equipped with or without agitators. The type of agitator that would be required would be dictated by the type of granular product to be run. Some products such as the wet and soft products like cherries or sliced peaches require a hollow auger type; other products like lima beans or dry beans could use a solid auger type or even a straight bar with spikes.

The shape of the hopper itself, particularly in areas near the top of the measuring pocket, is quite critical and each manufacturer has developed his own particular features that provide the most satisfactory results.

Movable hoppers rotate or oscillate. They are designed to keep the product from bridging or from being damaged.

Addition of Liquids

Most granular products are packaged in cans or jars with a covering liquid. It may be water, edible oil, brine, syrup or a sauce. It may be filled into the container before the granular product, at the same time as the granular product, after the granular product, or by some combination of these. Since this discussion is primarily concerned with fillers which are not covered by other papers on this program, it is pertinent to discuss at least briefly the methods whereby liquids are added to granular products.

Both the automatic fillers, or the pea and bean fillers, and the hand pack fillers have mechanisms for adding liquids to granular products. The usual automatic filler has a turret consisting of displacement cups operating in a tank of liquid so that the cups are timed to pour their contents down through the granular product measuring pockets. Thus, both liquid and granular product drop simultaneously into the container.

There are some exceptions to this principle of simultaneous filling. The hand pack filler has a simple time flow liquid dispenser which adds liquid to the container after the product has been filled. A recent automatic filler also adds liquid after the product has been filled. The separation of these two filling operations has some advantages. The liquid filler and the product filler portions can each do its respective job without interference from the other component.

One of the main problems in filling liquid after the granular product is the effective removal of air from interstices surrounding the product such as peas, spaghetti or beef stew, and from the interstices within the product such as red sour pitted cherries. Air is efficiently removed by these commercial methods:

(1) *Vacuum Liquid Filler.* Vacuum pulled on the product in the container and the covering liquid released under vacuum.

(2) *Partial Liquid Pre-fill.* Some part of the covering liquid is added to the container before the granular product, then the granular product filled, then the final required amount of liquid is filled on top.

(3) *Hot Liquid Percolation.* Sometimes followed by exhausting. This is the usual method of adding a liquid to a granular product after it is filled in the can. There is enough time delay to permit the air to expand and to be displaced upward through the downward flowing covering liquid.

Application of Fillers for Granular Products

Class I. Automatic with telescopic adjustable measuring pockets (peas, corn, lima beans, dry bean products, fruit cocktail, diced vegetables, hominy, small whole potatoes, whole tomatoes, sliced peaches).

Class II. Hand pack type filling directly in the container (cut green beans, whole potatoes, French fried potatoes, cherries, cut okra, pickles, mushrooms, olives, sliced carrots, cut asparagus, whole and halved fruits, stewed vegetables, whole and sliced beets).

Class III. Automatic with compressible measuring pockets (cut green beans, whole and French style green beans, shoestring carrots).

Performance of Fillers

The two most essential performance factors of interest due to their economic value are speed and accuracy.

Speed

Let's talk about speed first. The modern filler must not only be able to satisfy present capacity demands but it must have built within it a potential capacity greater than the present demand. The need for keeping pace is emphasized daily by packers who are continually analyzing the narrowing spread between costs and selling prices and reaching the inevitable conclusion, that they cannot continue in business by operating slow-speed filling lines. The burden of antiquated equipment, high labor demands and rates and scarcity of high quality seasonal labor emphasize the advantages of high-speed filling lines. To cope with these needs, machinery manufacturers have been building higher speed fillers through the past years. In place of the older 4, 6 and 8-pocket machines we now have 12 and 15-pocket machines. While utilization of such high-speed fillers reduces direct labor costs, they do insist upon higher caliber supervision and more effective preventive maintenance.

Automatic fillers run 20-25 containers per minute per pocket with products of the pea and bean type for containers up to 20 fluid ounces. As the container increases in size or as the product becomes more complex in shape and texture, the speed drops off to about 10 containers per minute per pocket. The newer automatic fillers with larger number of pockets still fall within these accepted speed ranges. Filler line speeds for No. 303 and No. 2 cans are now well above 300 cans per minute, and for the smaller cans such as 211x304 are at the 375-400 can per minute mark.

Hand pack filler speeds are highly variable because they are generally used for granular products not suited to the automatic filler. Their line speeds range anywhere from 50-200 containers per minute.

Accuracy

Second important economic factor is accuracy. Ben Way will go into detail on the subject of evaluating the filler, its control and its total performance from the standpoint of the operator.

Through the use of methods based on statistical analysis, the accuracy of granular fillers can be measured in reliable and reproducible mathematical terms. The filler manufacturer can mathematically determine any inherent defects in the design of new machines and in the adjustment of individual pockets. He is also able to determine when any machine in the field is malfunctioning.

It has been proven by thousands of individual weights of filled containers that an important and critical element in accuracy of granular fillers is not the construction of the filler itself but instead the proper adjustment of the filler to meet the often varying operating needs of the product.

But why are there varying needs in granular products? Briefly, there is an inherent lack of homogeneity in granular products that is not true of liquids and semi-solids. This factor is particularly disturbing when filling wet granular products because both automatic and hand pack fillers measure out products by volume and not by weight. In spite of this, regulatory bodies in the United States demand that with these products, the label of the container describe the content by weight and not by volume. The inconsistency of these two practices is apparent. Incidentally, Canadian law permits contents to be labeled by volume rather than by weight.

The lack of anything resembling an "apparent specific gravity" of the softer granular products requires constant practices throughout their preparation and packaging. Regular and uniform mechanical handling in the filler permits maximum accuracy.

Let me illustrate the effect of the product on the accuracy of a granular filler. An 8-pocket automatic filler is used for filling 10 ounces of dry popcorn seed and also for filling 11 ounces of blanched peas. The standard deviation for popcorn is 0.05 ounce but for blanched peas it is 0.15 ounce. In a manner of speaking, this filler is three times more accurate when running popcorn than when running blanched peas.

Now what do these figures mean to the operator? Just this: If the average weight of all popcorn is 10.10 ounces, then more than 99 percent of them will weigh between 9.95 and 10.25 ounces, a total range of 0.30 ounce. On the other hand, if the average weight of all cans of peas is 11.4 ounces, more than 99 percent of them will weigh between 10.95 and 11.85 ounces, a total range of 0.90 ounce. These results demand that the pea canner set his average weight higher than the popcorn canner in order to avoid under-filled cans. And, of course, the higher the average weight, the higher the per-can costs.

Such illustrations measure, almost mathematically, the variability of the granular product, in this case blanched peas.

Similar studies of frozen cut corn versus blanched corn and frozen peas versus blanched peas showed the frozen products were filled more accurately than the blanched product. The standard deviation of the frozen corn and peas was approximately half of that of the blanched corn and peas.

Installation techniques may affect the accuracy of soft texture products. When the supply hopper rests directly over the filler hopper it transmits a downward force directly on the granular product. This results in a variable packing pressure dependent on the height of product in the large high hopper. When the supply hopper is offset from the filler hopper, this relieves the direct pressure on the granular product being fed to the measuring pockets, permitting a greater accuracy of fill because of the greater uniformity.

It follows that intermittent operation of a granular filler is more disturbing to fill than the liquid and semi-liquid types of fillers. Smooth continuous flow of all fillers is highly recommended for best results. There is more danger in lots of "stop-start" motions with new high-speed fillers because of potential unbalance in the preparation line. Ben Way will pay particular attention to this factor in his analysis.

Filler manufacturers have added many devices and features to keep granular products flowing freely into the filler hoppers, into the measuring pockets and then into the containers themselves. Some of these are:

(1) External vibrators on filling hoppers.

(2) Agitators within hoppers.

(3) Rotary or oscillating hoppers.

(4) Polished surfaces of measuring pockets.

(5) Special surfaces of measuring pockets such as teflon, chromium plated, fluted or waffling.

(6) Vibrators on container tracks and guides. (Caution should be exercised with vibrators. If you depend upon them and they fail, accuracy is pitifully off. If the amplitude and frequency of vibration is not correct, they could actually fluff up a product rather than settle it down.)

(7) Fill adjustment on measuring pockets, preferably with the filler operating.

How much does accuracy mean to you?

Many packers are currently replacing obsolete, sloppy granular fillers with new high-speed accurate fillers at resulting lower total costs. In many cases, the payoff in any particular instance depends upon the actual improvement in accuracy, the costs of the product at the filler, and the yearly pack.

As an example, an improvement in accuracy of only $\frac{1}{10}$ of an ounce per can in a 100,000 case pack can mean a savings of 7½ tons of product; $\frac{2}{10}$ of an ounce per can saving can mean a total savings of 15 tons of product.

How much does accuracy mean to you?

Summary

Typical fillers for handling granular products have been described along with the dynamics of their mechanical features such as the style of hoppers, kind of measuring pockets, flow of product, and methods of adding liquids.

Product applications for the three classes of granular fillers; namely, automatic, hand pack and automatic with compressible pockets have been highlighted.

Special emphasis has been called to speed and accuracy of granular fillers as a means of evaluating total filler performances.

On behalf of the Canning Machinery and Supplies Association, I want to extend my thanks to the National Canners Association for this opportunity and to you assembled here for your attention and your consideration. Thank you.

Fill Control of Granular Products

By C. B. Way,
Green Giant Company

There can be no doubt of the need for maintaining proper fill of container at all times. Slack fills result in poor buyer and/or consumer acceptance. They could be subject to government seizure. Over-filling may be damaging to the product and is certainly uneconomical for the canner. In some cases proper fill is necessary to adequate sterilization of the product. It is the purpose of this presentation to suggest methods for evaluating fillers, for controlling the fill during the packing operation and for analyzing the over-all fill of a pack.

Before proceeding, let it be explained that the calculations mentioned herein can be made by any statistician. However, the mechanics of these calculations are not difficult and with a little practice can be carried out by the persons who do the fill work.

It should also be noted that much of the reasoning can be applied to products other than granular.

Evaluation of Filling Machines

Before setting up an intelligent fill control program, it is necessary to know something of the characteristics of the filler which is to be controlled. There are probably several good methods of evaluating fillers. The

following is one which is simple and direct. It considers granular products where product and brine, both separately and as a combined weight (net weight), are important.

The term "to evaluate a filler" as used here means to determine the fill characteristics or, in other words, the consistency or uniformity with which a filler will fill the product under various conditions of machine speed, product maturity, sieve sizes, etc. Fillers must, of course, be evaluated separately for each product for which they are used.

Individual Pocket Evaluation

First it is important to demonstrate that the uniformity of fill within any one filler pocket is the same as it is among all pockets. This is necessary in order that random samples may be taken from the filler as a whole without regard to the individual pocket, which greatly simplifies the procedure of determining the characteristics of a filler. It has been demonstrated many times and can almost be accepted without statistical proof because of the design and interchangeability of parts in modern fillers. However, many canners may wish to satisfy themselves on this point and can do so without difficulty. Also, it is entirely possible that a pocket may not have the same apparent volume as the others because of partial plugging, deposition of product, starching up or (very rarely) a construction error and this will be determined in the course of this procedure.

The following step-wise method is suggested for individual pocket evaluation. It should be noted that this procedure can be carried out for (1) brine delivery only (i.e., no product), (2) product delivery only and (3) total delivery on which net, drained and brine weights are compared. Some of these determinations might be considered of only academic interest. However, with brine packed products, about the only way in which the brine delivery can be checked is without product since it is almost impossible to eliminate some spillage from the completely filled cans in the course of drawing samples.

(1) The pockets on the filler should be numbered so that the samples can be identified with them.

(2) Have the line running steadily with brine and product "head" and the product drainage all remaining as constant as possible during the period of sampling.

(3) Draw the samples between the filler and the closer (or clincher) if and when this can be done without spillage and after closing when it cannot. Spillage may distort the upper end of the fill distribution curve, particularly with brine packs. Here again, the advantage of a "brine only" and "product only" determination manifests itself since neither product nor brine alone will normally fill the can enough to cause spillage.

These samples need not be consecutive, but each should be identified with the pocket from which it was filled. On some of the new high-speed fillers the brine and product are delivered from completely separate units and any individual brine pocket does not necessarily coincide with the same product pocket on each revolution. This should be taken into account when checking individual pockets.

Sample size depends upon the accuracy desired. A minimum of 30 cans per pocket is necessary and 50 or more are preferable.

(4) All weights (net, drained, and brine) on which the evaluation is to be made are taken, preferably to a tenth of an ounce (or finer, if possible).

(5) Arrange the data into a frequency distribution and calculate by pocket and on the combined data from all pockets the average weight and some measure of dispersion. Average deviation (i.e., the average of the differences without regard to sign of each reading from the average of all the readings) is satisfactory, but the standard deviation is of more value as will be shown shortly.

(6) Compare the pocket average weights with each other and with the over-all average for any statistically significant differences. Do likewise with the standard deviations or average deviations.

If no significant differences among the average weights of the pocket deliveries are found, the obvious conclusion is that all pockets deliver the same quantity. If, in addition, no significant differences among any of the standard deviations of the individual pockets and the standard deviation of the combined data are found, the starting hypothesis will have been upheld; namely, that the variation among the pockets is the same as it is within any one pocket, and the filler can then be further evaluated as a whole without regard to pocket identity.

Over-All Machine Evaluation

In order to get a fair idea of the operation of the filler, it must be evaluated as a whole and under various conditions of operation, such as speed, maturity, etc. The following is one method of doing this:

(1) The starting conditions should be as described above in the procedure for pocket analysis.

(2) Draw these samples from the line as before except that pocket identification may now be disregarded. One hundred cans per determination are suggested regardless of filler size.

(3) Align this data in a frequency distribution and calculate the average weight and the standard deviation.

At this point, a short explanation of some of the properties of the standard deviation will indicate its use.

In a normal frequency distribution such as shown in Figure I the average (X) of any given set of data plus or minus three standard deviations ($\pm 3\sigma$) includes practically all (99.73 percent) of the data. Likewise $\bar{X} \pm 2\sigma$ includes 95.5 percent and $\bar{X} \pm 1\sigma$ includes 68 percent of the data.

(4) Referring to Figure I and using the standard deviation just calculated, some fill properties of the filler can be described. An example will serve best for illustration:

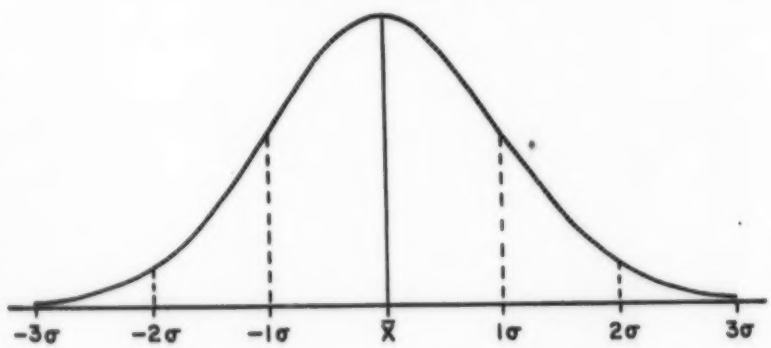
On one such actual run of this type the net weight of No. 303 peas was found to have a standard deviation of 0.15 oz. Based on the data taken and assuming an average net weight of 17.4 oz. the following can be said:

(a) Sixty-eight percent of the cans taken from this filler under these particular operating conditions will have net weights between 17.25 and 17.55 oz.

(b) Ninety-five and one-half percent will be between 17.10 and 17.70 oz., and

FIGURE I

Normal Distribution Curve



(c) Practically all will be between 16.95 and 17.85 oz.

The above procedure should be repeated once or twice under the same conditions as a check and under all conditions of speed, level of fill, maturity, sieve size, etc., at which the equipment will be operated. It might be shown that there will be some speed above which the filler begins to operate erratically or that there is some speed at which the waste will be greater than any economic saving due to high speed.

Control of the Filling Operation

Information gained from the above procedures has a very definite use. It is almost impossible for an operator to intelligently control an operation to the closest limits possible without knowledge of those limits. If he does not know those limits, and this has been demonstrated to be true many times, he will almost surely undercontrol or overcontrol, neither of which will do as good a job of keeping the fill uniform throughout the pack as will proper control.

One very useful tool for controlling many operations is the "control chart." This has become a very common control method and will not be discussed in detail here. However, a brief description of its application to fill control seems in order. A sample control chart is shown in Figure II. For fill control this would be set up and used as follows:

The "X" is the average fill desired and the upper and lower control limits are calculated from the standard deviations as determined in the evaluation of the filler.

The "R" is the range of fills in the sample, which must also be controlled as explained below.

A sample consisting of a few (4 or 5) cans is drawn and the weights are taken and averaged. The range of weights is also calculated. When this control chart method is used in its entirety, the average fill and the range of the sample are plotted on the chart and as long as they fall within the control limits, the machine is said to be "in control."

The advantage of this method lies in its preventing the operator from using a single can as a basis for adjustment of the filler. It also indicates to him what variation is normal and thus prevents him from overcontrolling by trying to adjust when no adjustment is warranted.

The use of the range chart is effective in detecting a single pocket out of control. A pocket may become partially plugged and deliver consistently less than the average fill. This will be indicated on the range chart.

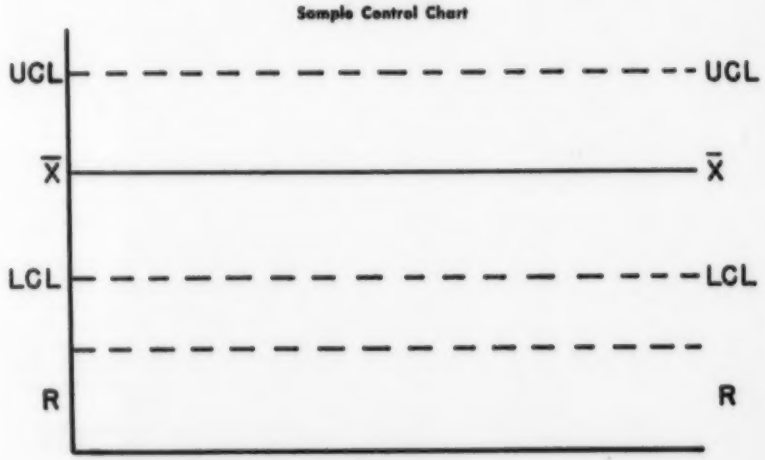
In order to make this range chart most effective the samples should be drawn consecutively from a filler so as to cover a maximum number of pockets. In some canneries where this procedure is in use, the sample size is the same as the number of pockets on the filler so that all pockets will be covered in each sample.

The control chart can also be used to indicate a trend toward the out-of-control range before that point is actually reached. For instance, the average fill may increase or decrease consistently during a series of samplings which would be unnatural and may indicate that some adjustment is slipping. Such an indication would, of course, call for an investigation of the filler at the first opportunity.

This control chart method is somewhat bulky to be used in its entirety because of the large number of charts which must be kept on hand to cover various maturities, etc. It can be simplified by eliminating the charts and just calculating the average and range and comparing them to a set of figures. A further modification eliminates the range calculation, and may even eliminate the calculation of the average. Actually, the data from a filler in good control can be readily evaluated by inspection with a little experience. The most important part of the control procedure is the continuous check on a definite schedule and using known control limits.

FIGURE II

Sample Control Chart



Analysis of Over-all Pack Fill

Having determined the characteristics of the filler or fillers and run a pack through under this control program, the canner will naturally be interested in evaluating his work. The following is one such method of doing so:

Determine the Distribution of Weights

It is necessary first to set up a frequency distribution of weights from pack samples. Most canners cut samples of each day's pack for quality evaluation and either do or can take the necessary weight measurements at this time.

Calculate the Percent Under-filled

Cans may be considered under-filled if they are below the declared label weight (net weight) or below some standard minimum net, drained or brine weight which may have been set by the canner on the basis of good eye fill. This percent under-filled is a good indication of the filling job that was done.

Determine the Average Weight and Standard Deviation

From the frequency distribution calculate the average weight (be it net, drained or brine weight) and the standard deviation.

Examine the Difference Between the Average Weight and the Minimum

If there are to be practically no under-fills, the average weight will have to be three standard deviations above the minimum (since nearly 100 percent of the data is included in the average plus or minus three standard deviations). If the average is only two standard deviations above the minimum ($\pm 2\sigma$ includes 95.5 percent) it can be expected that about 2.25 percent will be under-filled. The other 2.25 percent is on the other end of the distribution.

The normal standard deviation for No. 303 peas over a season's pack has been found to lie between 0.25 and 0.4 ounce which means that in order to have about 98 percent of the weights above the minimum, it is necessary to fill to an average weight of 0.5 to 0.8 ounce above the minimum.

Excessive under-filling can be reduced either by increasing the average fill or by decreasing the standard deviation which means decreasing the variation or improving the uniformity.

Now let us examine these two methods closely. If the average fill is raised, not only will the fill of the containers on the low side of the distribution be increased (thus decreasing under-fills), but the same will happen to those that are already on the high side of the distribution. Some of these which may already have been over-filled are now more grossly over-filled resulting in damage to the product and/or excessive spillage.

The other suggested method of reducing under-fills is to decrease the variation in fill. This appears to be a much more practical and economical method, because in so doing, the average fill remains the same and both ends of the distribution are brought in toward the average, thus decreasing both under-fills and over-fills.

In practice it may be necessary to do both.

The possibility exists that a cannery, because of excessive variation, is continually over-filling (on the average) in order to keep the under-filling to a minimum. In such a case it might be possible to reduce the average fill and variation in fill without increasing the number of under-fills. This would undoubtedly effect some saving in product and/or brine.

To apply this theory to granular products such as snap beans, peas, limas, corn, etc., is much "easier said than done." Many variables complicate this problem of fill considerably, such as temperature of fill, the size and shape of the product, variations in maturity, the desired headspace, the desired vacuum, etc. The following are a few of the factors which when properly applied have been shown to be useful:

(1) Fill control during the operation.

(2) Smooth transfer of open cans after filling to keep spillage losses at a minimum.

(3) Vibrating tracks under filler pockets. These can do more harm than good if improperly operated.

(4) Positioning of cans so that product mounds in center of can.

(5) Gearing filler speed to the rest of the operation to eliminate stops and starts.

There are undoubtedly many more.

Summary

In summarizing, a method of setting up fill controls based on a statistically sound method of filler evaluation has been suggested. A simple fill control program has been briefly outlined and a method of evaluating the pack fill as a whole has been laid out. These are adaptable to most filling operations, probably with slight modification in some cases.

The maintenance of proper fill of container throughout a pack is possible only with a thorough knowledge of the operation and with constant vigilance.

Filling Semi-solid Products

By H. Ivor Edwards,
The Pfaudler Company

Piston-type filling equipment has finally found its place in the sun and now is one of the most important pieces of machinery in your plant. The type of filler you use and its age may well determine whether you will make a profit this year or not.

Ten years ago a filler was a necessary evil, just another piece of equipment. They were similar to and worked like a piece of farm machinery. Little or no thinking had been devoted to sanitation or long life, and speed of fill was not a major consideration.

Competition and economics have changed all this and today fillers are available from several sources that make possible accurate filling at high speeds. Gear trains now run in oil and most exposed parts are lubricated from a common place with one shot.

In 1941 we purchased patents and manufacturing rights on all fillers of the King Sales Co. in San Francisco and thereby acquired their line of gravity and piston fillers. The piston filler proved to be a cumbersome affair, fabricated of carbon steel, using cast spur gears. We turned this over to our design group and two years later installed our first sanitary unit at one of Beech-Nut's plants. This filler had a rated speed of 250 cans per minute, but it was soon found that it could be satisfactorily operated at 350 cans per minute. This unit was filling 5 oz. baby food jars and giving an accuracy previously unobtainable. About six months later Beech-Nut informed us they wanted us to build a similar machine to fill the same jar at 550 cans per minute. Within a year our RP-21 was born and we were firmly launched in the filler game. Since that time we have sold hundreds of similar machines for handling a wide variety of products, among them condensed milk, evaporated milk, processed cheese, sauces, soups, apple butter, jellies, preserves, pie mixes, cream style corn, creamed mushrooms, chocolate syrup, potted meat, dog food, and motor oil, in all viscosities from #10 to #70.

Trend to High Speed

I mentioned previously one canner's desire for faster filling speeds and this certainly is the trend. I predict that by 1956, all baby food and frozen juice concentrate will be filled at operating speeds of 750 to 1000 containers per minute. As the cost of labor increases, the food packer is forced to economize by taking advantage of technological improvements, such as accurate fill and higher filling speeds. Instead of an additional line and more manpower, you now replace the line with one that increases output 100 or 200 percent. The following figures dramatically illustrate this point.

A Florida plant, operating two fillers handling a maximum of 500 containers per minute, replaced these machines with two of our RP-21's and were able to fill 700 containers per minute with the same personnel.

This adds up to 12,000 more containers per hour, 96,000 more per day. At a minimum profit of 3 cents per can, the total daily savings were $2,800. It doesn't take long for the filler to pay for itself on this basis.

Control of Fill

Now that's only one-half our economics lesson because equally important is the accurate control of fill. We had the advantage of entering a new field that made it necessary that we study all existing filling equipment, their good points and their faults, and as a result we designed our machine accordingly. We found, for instance, that filling machines in general were blamed for spillage that occurred during transfer to the closer, and this was due to variances in conveyor speed and diameter of feed and discharge stars. We realized the need for a close hook-up and worked with American and Continental so we could sweep right from our filler directly to the seamer without speed change. Our machines were then built to conform with the seamer shape and we eliminated one big headache that had been plaguing users in the past. Piston fillers are very accurate. The motion of the piston assures injection of a precise quantity of product in the container. The amount of fill is measured by the exactly controlled stroke of pistons within accurately machined cylinders, not by containers, which usually vary in capacity. Gravity or vacuum-type fillers will uniformly fill to a predetermined level, but the gravity will vary depending on the container. Even while a piston filler is operating, the amount of product being filled can be precisely adjusted by raising or lowering the cam track by means of a single micrometer thumb screw.

For most applications we guarantee to fill within a tolerance of plus or minus 1/10th oz. For large cans or for some products, the tolerance may be slightly larger.

I would like to make the point that while I am talking about our own filler, because I know more about it, similar units made by others have many of the features discussed and are generally of similar design. We consider them worthy competitors and believe they feel likewise.

The other very important point to a canner is sanitary design and ease

of cleaning. Piston fillers are outstanding in this respect and have only a few parts to disassemble, and these can be taken apart quickly without the use of a wrench or other tools.

Let's talk dollars and cents again.

A California packer of hot citrus concentrate installed a 14-station filler and was so pleased that they ordered two more, even though the fillers replaced were relatively new. A check of quality control records over a year's time shows variation in fill of orange concentrate to be consistently in the range of plus or minus 0.02 fluid ounces per 6-oz. can. Dollar savings amounted to several times the cost of the three fillers during one season's pack. These savings soared into six figures and will continue year after year.

Another example, a 21-station filler replaced one which lost, through sloppy fill, a minimum of one-half ounce per jar when filling at the rate of 450 cans per minute. This amounts to 108,000 ounces per day and 32,400,000 ounces lost per year. This is equivalent to 6,480,000 5-oz. jars and at a product cost of .01 per jar, this is a loss of $64,800 per year.

In this day and age you cannot afford to work with slow inaccurate filling equipment. Speaking of speed, you will be interested to know that we are currently building a similar accurate filling machine for one of America's leading baby food packers, that will have a speed of 800 containers per minute. We may even hit the 1000 per minute output speed. Or over 16 containers per second! Look at your watch sometime and see how fast one second goes by. At 800 cans per minute, this is a ton of baby food every 8 minutes! The can companies are building closing machines especially for this unit and we expect to make the initial installation within a month. We know that these will be the forerunners of many more that will be ordered this coming summer when we release these units for general sale. We are not accepting any additional orders for this new machine until it has been actually field tested.

Where will this demand for increased speed stop? Who knows? Ten years ago we would have said that filling speeds of 500 per minute were fantastic. If the need is evident and industry demands same, American ingenuity will find a way and we are happy to have a part in this progress.

Improvement Continuing

As a company, we spend 3 to 5 percent of our sales volume on research and development, and one phase of this activity is directed toward improving mechanically our current models. Therefore, our 1954 models feature improvements that are very worthwhile. To mention a few:

(1) Fabricated cylinders of type 316, No. 4 polish, stainless steel, instead of cast stainless on RP-35's.

(2) Pistons of virgin nickel.

(3) Jig formed even-action cams, eliminating spurt filling.

(4) Replaceable wearing surfaces on valve clips.

(5) Improved even-wearing rollers.

We must realize that at high speeds there is bound to be some wear and, therefore, our units are designed so that wear occurs on easily replaceable and inexpensive parts. The maintenance of such a machine is not expensive. A Chicago canner, filling various types of soup, reports records of filling one million cans at a parts replacement cost of less than $100, or one hundredth of a cent per can.

We also manufacture gravity fillers and pocket type units and can definitely state that for accurate fill, speed and ease of cleaning, plus versatility, the piston filler has all the advantages but other conditions often dictate the use of the other type machines.

What are your plans for 1960? Have you analyzed where you will be production-wise in 1960? It's a good time now to take a look and plan accordingly. You will be surprised to find that much of your present equipment will need to be replaced with more modern high-speed units if you are to operate at a profit in 1960 in the face of vigorous competition.

The food industry, more than any other, is closely geared to population growth. Our present population is 160 million but growing at the rate of 1½ percent per year. This doesn't sound like much in percentage, but means more to us when we say an average 2,500,000 additional mouths to feed every year. Therefore, by 1960, we will have a population of 175 million.

If you are to enjoy the same percentage of volume that you now have, plus some normal expansion, you will be 25 percent larger by 1960.

Make your plans now so that you will be in a competitive position in 1960, and we hope your plans will include some of the type of equipment that I have described.

Filling Semi-solid Products

By W. A. Brittin,
Beech-Nut Packing Company

Basically, the problems involved in the filling of semi-solid products vary little from those encountered in the filling of any other type product. We must deliver a certain amount of product to a container with a degree of accuracy and a rate of speed which will render the whole operation economical.

The problems of my particular company are the filling of purees and foods of a coarse particle size designed for infant feeding. We have a large variety of products with varying degrees of viscosity and consistency, and all of these products must be filled from the same general type of filler. We fill into two sizes of container, a 5-oz. overflow capacity jar and an 8-oz. overflow capacity jar. Depending on the nature of the products involved, we declare a 4¾ or 5-oz. net weight for our "strained" items and a 7¾ or 8-oz. net weight for our "junior" items.

Perhaps our biggest problem in recent years has been tied up with the matter of speed of fill. The efficiency of raw material preparation has increased to the point where a larger volume of material is available for the filler to handle. With the development of automatic loading and unloading equipment, fillers have been able to run at higher speeds and the pressure has been on the machinery companies to deliver filling equipment which will run at increased speeds with increased accuracy of fill. At the present time, we are filling our baby food items at rates in excess of 500 jars per minute. We are certain that these filling speeds can be increased and the thoughts of 1,000 jars a minute filling speed are not nearly as fantastic as our 500 jars a minute filling speed were a short number of years ago.

The accuracy of fill is extremely important no matter what the filling speed might be. Careful checks have been run on our present filling equipment and our records indicate an accuracy of better than one-tenth of an ounce between the maximum and minimum net weight from the various filler heads. This one-tenth of one ounce represents a maximum variation and the average variation is actually much less.

With increased speed comes a tendency for increased sloppiness of fill. This in itself is a very important factor, for in our operations one-eighth of an ounce loss per jar can amount to an additional 30,000 ounces at the end of a day's run. Our modern fillers can run smoothly at these increased speeds with a very accurate fill and little, if any, indication of sloppiness.

Another factor in our filler selection involves the ease with which it

can be cleaned. In our own particular business, we disassemble all equipment at the end of each working day for a thorough cleaning. Obviously, the simpler the construction of the machine, the easier it can be cleaned and the less chance there is for failure to clean properly. Closely correlated with the simplicity of design from a cleaning angle is the simplicity of design from wear and tear. A machine which cruises along at 500 containers per minute is receiving much more wear on its moving parts than one which fills at 200 or 300 containers per minute. It would be foolish to expect parts not to wear, but we are pleased to have this wear occur on easily replaceable parts.

A few years ago, we encountered great difficulty in the filling of our junior food items which have a coarse particle size and, as with some vegetables, a certain amount of free liquid. It has only been within recent years that we have been able to fill these items successfully at high speed. In the past, we have had difficulty in getting uniform products to the jars and in some instances have had a reduction in particle size due to action in the filler.

We would not care to predict where these filling speeds will end in products such as ours. Many complicating factors are involved and the fillers themselves must be looked at as integral parts of the complete operation. To increase speed to 1,000 or more per minute would require a revamping of all the operations prior to the filling. There must be more efficient preparation of raw materials, either through better machinery or an increase in the amount of machinery. There must be an increase in the speed or efficiency of handling the empty containers; faster seamers or cappers would be required. In our case, where we pack in glass, we would have to have a more efficient and faster means of removal of the sealed packages into retort crates. We use a spot label and in our case faster filling speeds would also necessitate faster labeling speeds, or additional labelers. We cannot help but feel there is a point of diminishing return in simply increasing the filler speed.

We have been pleased to be a party to these increases in filler speeds. First, we have taken some satisfaction in the fact that through the streamlining of our operation and the increase in efficiency, we have been able to create a demand for fillers with increased filling speed, and we have been very gratified at the response and cooperation given us by the filler manufacturers who today can provide fast, efficient, economical, high-speed filling equipment.

PROCESSING PROBLEMS

Recent Experiments in Radiation Sterilization of Foods

By G. B. Pratt and O. F. Ecklund, American Can Company

In the last few years the possibility of using gamma radiation from nuclear fission products to sterilize foods has captured the imagination of the canning industry. The particular attraction of radiation sterilization arises from its power to sterilize without any appreciable temperature change, thus suggesting the possibility of packaging raw foods in hermetic containers which would not require refrigerated storage.

Nuclear fission products, as the name implies, are radioactive fragments from the fission of uranium-235 or other fissionable atoms, and accumulate as byproducts from the operation of atomic piles to produce nuclear power or to manufacture plutonium. These fission products include isotopes which are constantly producing gamma radiation, a form of very penetrating radiation which is almost identical to X-rays and which will kill microorganisms.

Since actual fission product sources of gamma radiation are not now generally available, experimental work must depend on a simulated fission product source. Cobalt-60, which is artificially produced by neutron bombardment of cobalt-59 in a nuclear reactor, serves this need in a very satisfactory manner.

The cobalt-60 gamma radiation is not only similar to that from fission products but should give results approximating those from machine generated X-rays or cathode rays due to the general similarity of their action.

This paper will describe experiments, most of which were performed at the Food Technology Department of Massachusetts Institute of Technology, to find some of the important factors affecting the sterilizing dose of radiation required. In addition, organoleptic examination of samples of four types of meat subjected to a typical sterilizing dose of gamma radiation will be reported. These latter samples were sterilized at the University of Michigan.

This is, then, a two-pronged approach to radiation sterilization. First, what factors will dictate the sterilization dose required? And second, what are the effects on the organoleptic qualities of the food?

Some Factors Affecting Dosage Requirements

To evaluate the resistance of a suspension of organisms to radiation, the suspension was sealed into 5 ml glass ampules approximately 16 mm in diameter and 45 mm long. These were inserted into a specially designed aluminum cylinder so that the position of each ampule was known and reproducible.

This aluminum cylinder was in turn inserted into a 1½ inch cylinder of radioactive cobalt-60 of about one kilocurie activity. While both beta and gamma radiations are being constantly produced by this cobalt-60 source, the beta rays are entirely absorbed by the aluminum.

Radiation dosages are quoted in terms of rep_{Se} units. One rep_{Se} unit may be defined as the dosage which releases 93 ergs of energy in one gram of irradiated material.

The doses reported herein were calculated from dose rates determined by irradiating ampules of ferrous ion dosimeter solution under the same conditions as the bacterial suspensions, and employing the relationship that 20.2 micromoles per liter of ferric ion is produced per 1,000 rep_{Se}.

Type of Contaminating Organism

Spore forming bacteria have shown themselves to be the most resistant of food spoilage organisms to both heat and ionizing radiations and are therefore of greatest interest in determining dosage requirements.

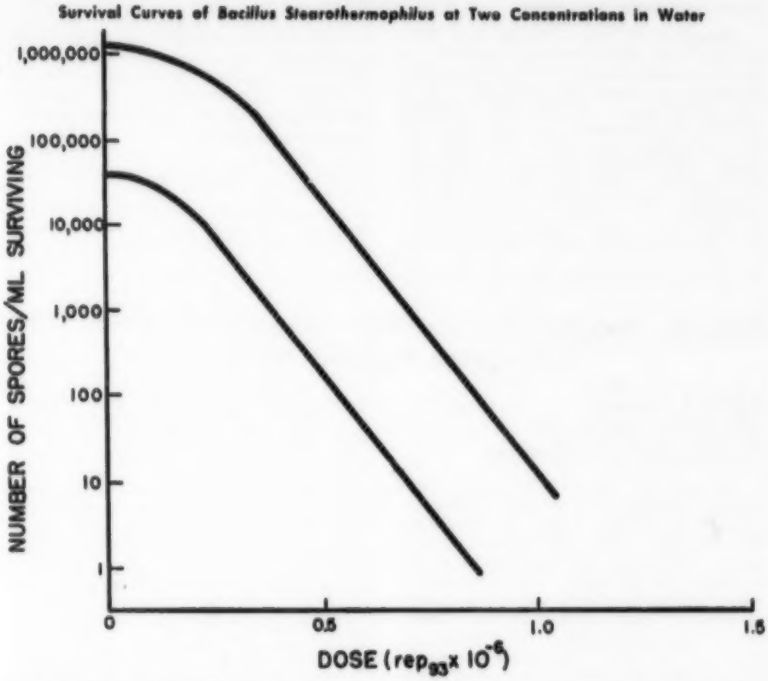
Different types of spore forming organisms, however, display different degrees of resistance. Suspensions of four important organisms in pork pea infusion broth were sealed in glass ampules and inserted for varying times in cylinders of radioactive cobalt-60 at the Brookhaven National Laboratories. In these experiments, spores of *Bacillus stearothermophilus* (F.S. 1518) and *Clostridium botulinum* showed the greatest survival with *Clostridium sporogenes* (P.A. 3679) next, and with a *Bacillus* isolated from spoiled meat showing the least resistance. As a matter of fact, the suspension of F.S. 1518 showed a resistance comparable to that reported for *Clostridium botulinum* in a different medium by B. H. Morgan and C. W. Bohrer of the National Canners Association at the last Convention. Thus, further work has involved principally F.S. 1518.

Number of Contaminating Organisms

Irradiation of two water suspensions of F.S. 1518 spores, one with about forty times the concentration of spores of the other (as was done at M. I. T.), resulted in the phenomenon illustrated in Figure I. For any given dose, the same percentage of organisms survived in either suspension, leaving always about 40 times as many organisms in the concen-

FIGURE I

Survival Curves of *Bacillus Stearothermophilus* at Two Concentrations in Water



trated suspension as in the dilute. Thus, for a higher contamination, a greater dosage is required to effect a complete destruction than when contamination is less.

Medium in Which Organisms Are Irradiated

Figure II illustrates survival curves of spores of F.S. 1518 irradiated in two media: deionized water, and nutrient broth. It is immediately apparent that very much greater doses would be required to induce contamination by a given amount in nutrient broth than in water. It seems possible, therefore, that different types of food products might require different doses for sterilization.

Acidity (pH) of Medium

Nutrient broth was adjusted to a series of pH levels between 3 and 9, inoculated, and irradiated to determine whether the changed level of acidity would influence survival of F.S. 1518. Statistically significant differences in survival were actually noted although the differences were small. In contrast to conventional heat sterilization where spores are more readily destroyed in acid solutions, the evidence indicates that the least resistance, in the range from pH 3 to 9, may be near the neutral point for this organism.

Presence of Air During Irradiation

When suspensions of spores of an anaerobe, P.A. 3679, and an aerobe, F.S. 1518, were irradiated at about 650,000 rep, both in air and under 29 inches vacuum, percent survival of 3679 was 3.3 percent in air and 5 percent in vacuum. Survival of 1518 was 2.9 percent in air and 9.3 percent in vacuum. These differences are calculated to be significant at the 1 percent level of confidence in the case of the 1518 and at the 5 percent level in the case of 3679.

Presence of Sodium Ascorbate

Sodium ascorbate has been proposed as an additive to react with free radicals formed during irradiation to help prevent color and flavor changes in some products. It was of interest to determine whether it also protects bacterial spores which would, of course, necessitate higher radiation doses for sterilization.

Experiments with sodium ascorbate at levels of 1/10 percent and 1 percent in nutrient broth indicated no significant effect on survival of spores of 1518.

From the number of factors influencing the required dosage, it is apparent that no one sterilizing dose can be recommended for all possible applications.

Organoleptic Examination of Irradiated Meat

Perhaps the first concern after assurance that sterilization can be effected with gamma radiation is over the taste, odor, and appearance of the product so sterilized.

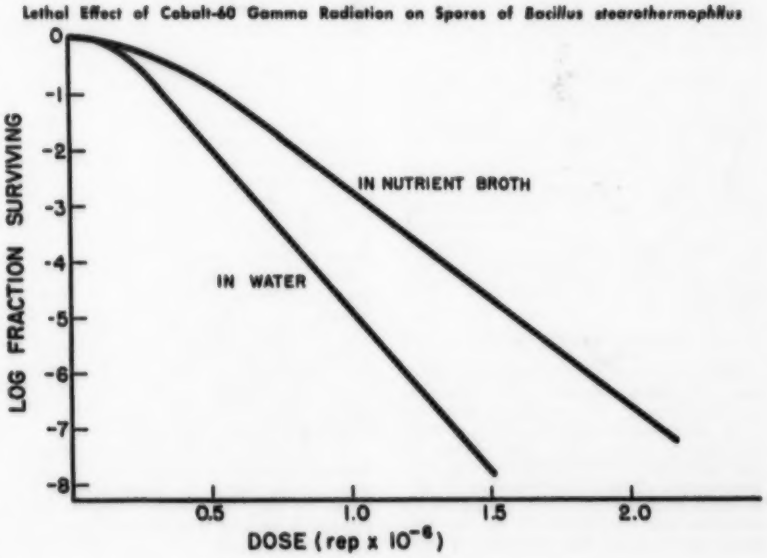
To investigate the organoleptic properties of irradiated meats, samples of ground beef, beef tenderloin, pork luncheon meat, and ham in 211 x 300 cans were subjected to a 2 million rep dose of gamma radiation from the 10 kilocurie cobalt-60 source at the University of Michigan.

Although the Michigan source is probably the strongest available in the world today, radiation time required was over 24 hours.

Samples have been stored at 40° F., 70° F., and 98° F., and have been

FIGURE II

Lethal Effect of Cobalt-60 Gamma Radiation on Spores of *Bacillus stearothermophilus*



opened at one to two month intervals to date, the latest examination having been at five months.

The appearance of the irradiated beef resembled attractive fresh meat and did not show the overcooked appearance of the thermally processed controls. The pork luncheon meat, however, was abnormally fat so that liquified fat separated out from the rest of the meat in all samples, with the fat from the irradiated samples being a pinkish hue. The irradiated ham was firmer and lighter in color than the thermally processed sample.

The samples were subjected to organoleptic analysis by an experienced taste panel. A divergence of opinion as to flavor was found. Some tasters did not detect an off-flavor in all of the irradiated samples, and a few who did detect flavor differences did not find the irradiated flavor objectionable. Most of the tasters, however, reported varying degrees of off-flavor. Ham appeared to have the least noticeable off-flavor.

When samples stored at 40°F., 70°F., and 98°F., have been compared, no consistent differences have been found in samples stored at these different temperatures, nor was any apparent differences in degree of off-flavor reported after different periods of storage.

Samples of beef and pork were irradiated with and without sodium ascorbate to determine whether the irradiation off-flavor was reduced by this additive. Some improvement in beef flavor seems to have been accomplished by the ascorbate although the difference cannot be reported as conclusive. No difference was found in pork luncheon meat with added ascorbate.

Irradiation in the frozen state resulted in improved flavor in the irradiated beef, but again, this difference was not noted in the pork.

Pasteurization of beef by heating to 160°F. can center temperature after irradiation did not affect the off-flavor in any consistent manner nor did frying the samples prior to testing. The object of the pasteurization treatment was to inactivate enzymes. Consideration of these flavor results would indicate that enzyme inactivation may not be necessary with these meat products. However, these results are not believed to be typical of most food products.

Summary and Conclusion

Many factors were found to affect the radiation sterilization requirements of food. Among these were the type and concentration of the contaminating organisms, the nature of the medium in which the organisms are contained, and the presence of air. Factors having but slight effect or no effect at all were the pH of the medium containing the organisms and the presence of the free radical acceptor, sodium ascorbate.

Samples of meat which had been subject to sterilization dosages of gamma radiation were found by many tasters to have objectionable taste characteristics. This objectionable flavor was reduced in beef but not entirely eliminated by irradiating the meat while frozen or, to a lesser extent, by the addition of sodium ascorbate. The objectionable flavors produced in pork were not reduced by these treatments. Pasteurization after irradiation seemed to have no effect on the flavor after storage.

The results indicate no serious deterioration in quality during storage of radiation sterilized meats, but the off-flavors developed by the radiation continue to present an obstacle to commercial application.

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Enzyme Regeneration in High Temperature-Short Time Sterilized Canned Foods

By R. B. Guyer and J. W. Holmquist, Continental Can Company

As you well know the public wants a high quality product at a low cost. The canner must meet the demands of the public but still must make a profit; therefore, he must operate as efficiently as possible. These demands have brought about many developments and improvements in unit processes and techniques; for example, high temperature-short time sterilization techniques which have not only speeded production, but have also improved the quality of the sterilized canned food products. The use of high temperature-short time sterilization techniques has brought to our attention factors which previously had not been given too much consideration in thermal processing. One of these factors is the inactivation and subsequent regeneration of enzymes.

It has long been recognized that enzyme activity has an adverse effect upon the quality of fruits and vegetables. Although a great deal of data has been reported on the inactivation of enzymes in dehydrated or frozen fruits and vegetables, only a limited amount of data has been reported on the inactivation of enzymes in canned fruits and vegetables. One example reported concerns the early attempts to can or bottle citrus juices. These attempts were unsuccessful primarily because the amount of heat required to pasteurize the juice was not sufficient to inactivate the enzymes. As a result of the enzyme activity there was a loss of flavor and a loss of cloud. Dr. Joslyn and his associates (2) at the University of California studied the problem and found that it was necessary to heat citrus juices to 190°F. to 200°F. to inactivate the enzymes and thus maintain the cloud in the processed citrus juices.

Dr. Esselen (1) of the University of Massachusetts, in reviewing the thermal inactivation of enzymes as related to heat processed canned food products, stated that it has been frequently assumed that the heat treatment given canned products to destroy microorganisms capable of causing bacterial spoilage was more than adequate to destroy enzymes naturally occurring in the tissues of most plant life. Dr. Esselen further stated that while this assumption is undoubtedly true in the case of low-acid foods which require a relatively long process to destroy bacterial spores, it may not necessarily hold in the case of acid products such as fruits and pickles which usually are given a relatively short and mild heat treatment.

As early as the turn of the century, various investigators reported a phenomenon known as regeneration of enzymes. These investigations, for the most part, have been limited to regeneration of the enzyme peroxidase. There were several reasons for this. The enzyme peroxidase is commonly found in fruits and vegetables, and available information indicates that it is one of the most heat resistant enzymes normally encountered in these foods. In addition, its presence is easily detected by a relatively simple test. For these two reasons, the inactivation of peroxidase has been used extensively as an indicator of adequate blanching or enzyme inactivation especially in the fields of dehydration and freezing.

The phenomenon of regeneration of heat inactivated peroxidase has been studied by a number of investigators. For example, when working with turnip juice, Schwimmer (6) of the U. S. Department of Agriculture found that regeneration was largely a function of the heat rate. Fellers and his associates (3, 4, 5) at the University of Massachusetts extensively investigated thermal destruction, regeneration, and stability of peroxidase in acid foods and found that while peroxidase showed evidence of regeneration after it had been partially inactivated by heat, no evidence of regeneration was evident up to 20 hours after heating if the enzyme was completely inactivated initially.

The destruction of an enzyme is entirely dependent upon the amount of heat required to denature its pro-

tein constituents. The regeneration of heat inactivated enzymes has been attributed to a reversion of the denatured protein to its native state after heating and cooling. It would appear that the enzyme must be heated sufficiently to irreversibly denature its protein in order to prevent regeneration of the enzyme. The time-temperature relationship necessary to prevent this undesirable enzyme regeneration in heated or processed foods is limited to little data, some of which are shown in this work. In some cases, partial inactivation of the enzyme seems to be sufficient to prevent undesirable changes in the ultimate product, such as some dehydrated and frozen foods. Since the enzyme peroxidase catalyzes the oxidation of various compounds, a slight degree of enzyme regeneration might lead to undesirable changes in food products if given a long enough time to react.

As previously stated, it has been assumed generally that the long heat processes given low-acid foods are adequate to destroy enzymes. However, with the introduction of the high temperature-short time principle of sterilization, employing the agitating type retort or flash sterilization in conjunction with aseptic canning, the problem of enzyme inactivation and subsequent regeneration became an important factor in determining processing times.

During the years which saw the development of short time-high temperature techniques in the heating and sterilization of canned foods, a number of observations were made concerning the peculiar behavior of the quality of the canned products. Although at the time the causes seemed remote, the bulk of the evidence now available certainly indicates the changes were the result of enzyme activity. For example, when flash sterilization of citrus juices was first introduced, it was found that the sterilization temperatures normally employed (180°-190° F.) were insufficient to prevent enzyme activity, and it was found necessary—in some cases—to raise the temperatures to as high as 240°F. to effect complete enzyme inactivity. Although the raise in temperature was substantial and more than adequate to destroy spoilage organisms, it did not adversely affect the flavor.

In some of the early test packs of canned whole kernel corn processed at high temperatures for short times, it was noted that the general quality of the corn after processing was exceptionally good, but that an off-flavor tended to develop as the storage period was lengthened. To eliminate the off-flavor development it was necessary to increase the sterilization value of the process by increasing the time at a given temperature. Similar observations were made in test packs of several Chinese-type foods.

During 1950, an investigation was undertaken to evaluate the use of the high temperature-short time principle for canned peas. The processing temperatures used were 280°F., 300°F., and 320°F. The times at these temperatures were such that the calculated sterilization values were well above those necessary for sterilization. However, it was noted that off-flavors and odors developed in most variables. The off-flavor was described as the typical strawlike off-flavor normally associated with underblanched frozen peas. An examination showed catalase and peroxidase activity in nearly all variables.

As a result of these findings an investigation was undertaken to study enzyme inactivation and possible regeneration in canned peas processed in a high temperature-short time agitating retort. For this purpose freshly shelled sweet type peas were washed, water blanched at 190°F. for three minutes, and cooled. The peas were filled manually into enameled 202 x 214 cans and boiling brine was added just before the cans were closed. The cans were then processed for various lengths of time to calculated sterilizing values in an agitating-type retort at 260°F., and in a still-type retort at 250°F. and 240°F. The agitating type processes were carried out in a laboratory model, end-over-end retort. The still processes were carried out in thermal death time units, since with these units it was possible to bring the temperature to the desired point almost immediately and to cool very rapidly following processing.

Table 1

Peroxidase Activity and Flavor of Canned Peas Stored at Room Temperature for Eight Months

Sterilizing Value F_o	Process time in Minutes	Percent of Original Peroxidase Activity	Flavor
	260° F. Agitating Process		
5	3	0.4	Very Viny Off-Flavor
9	4	0.4	Very Viny Off-Flavor
12	5	0.1	Slight Viny Off-Flavor
16	6	0	No Off-Flavor
20	7	0	No Off-Flavor
23	8	0	No Off-Flavor
	250° F. Still Process		
3	6	0.25	Very Viny Off-Flavor
5	8	0.1	Slight Viny Off-Flavor
7	10	Trace	No Off-Flavor
9	12	0	No Off-Flavor
11	14	0	No Off-Flavor
13	16	0	No Off-Flavor
	240° F. Still Process		
3.5	15	0	No Off-Flavor
4.9	20	0	No Off-Flavor
6.3	25	0	No Off-Flavor
7.7	30	0	No Off-Flavor
9.1	35	0	No Off-Flavor
10.5	40	0	No Off-Flavor

The peroxidase activity was determined on the raw peas, both before and after blanching on each processed variable within two hours after processing and at intervals after several months' storage at room temperature. The results of the peroxidase activity determinations are presented in Table 1. The symbol "F_o" is the equivalent sterilizing value of the process in terms of minutes at 250°F. It is a means of comparing processes. The longer the process the higher the F_o value for a given temperature. Most commercial processes for peas in small can sizes are based on an F_o value of 8. A number of the variables included in this investigation fall considerably below this value, but this was done so that a comparison could be made between theoretical bacterial destruction data and a possible curve for enzyme inactivation.

As might be expected, peroxidase was very active in the peas before they were blanched. There was no detectable activity immediately after blanching or in any of the canned variables within two hours after processing. All of the variables were again tested for peroxidase activity 24 hours after processing. As shown in Figure I, the variable given the shortest process in an agitating retort at 260° F. had a fraction of one percent of its original peroxidase activity. In all subsequent examinations this variable continued to show enzyme activity at approximately the same level. After one and two weeks' storage at room temperature, examinations revealed regeneration of peroxidase in two other variables processed at 260°F. in an agitating retort.

Peroxidase activity was detected in several variables processed in a still retort at 250°F. However, it should be noted that in this case, where regeneration occurred, the processes are below those recommended for peas.

No enzyme activity was detected in any of the variables processed in a still retort at 240°F., even though a majority of the variables fell short of the recommended process time at this temperature.

After eight months' storage all variables were taste tested. The results show that those variables which had continually showed evidence of peroxidase activity throughout the studies (Variables 1-2-7) had a very definite viny-type off-flavor. Some of the variables (3 and 8) which had lower levels of activity were judged to have a slight viny-type off-flavor.

The data which are presented seem to indicate that thermal inactivation of enzymes in processed peas does not follow the same type curve as that for the thermal destruction of microorganisms. The majority of the vari-

ables processed at 240°F. were given processes below that recommended for peas; yet no peroxidase activity was noted in any of these variables. It would appear that under these conditions the time and temperature were adequate to inactivate the enzyme. On the other hand, enzyme activity was noted in variables of F_0 value 9 and 12 when the peas were processed at 260°F. in an agitating type retort. These results would seem to indicate that the curve of destruction of peroxidase in canned peas is much flatter or less steep than that effective for bacterial destruction.

As previously stated, the many improvements and developments which have been made in processing techniques have not only speeded production, but have also improved the quality of the sterilized canned food products. By application both experimentally and commercially, high temperature-short time processes have been shown to have definite quality and nutritive preserving benefits for many natural and formulated food products. The time-temperature relationships used in specific applications are determined mainly by the time-temperature requirements for the destruction of spoilage bacteria. The main objectives of these studies, as reported, are to bring forth a limited number of observations which clearly show that enzyme regeneration does occur and that the time-temperature relationship for high temperature processes must be clearly established for complete enzyme destruction in some products to insure flavor stability. In instances where the enzyme regeneration problem exists, longer times of heating must be used to meet enzyme destruction requirements. Fortunately one of the inherent advantages of high temperature-short time processing is that this additional amount of heat may be applied in a very short time. From a practical standpoint, this should encourage the broad application of the short time-high temperature principle for the advantages, particularly qualitywise, which may be obtained for many products.

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Container Sterilization for Acid Products by Hot Fill-Hold-Cool Procedures

By C. P. Collier and C. T. Townsend, Western Branch Laboratory, National Canners Association

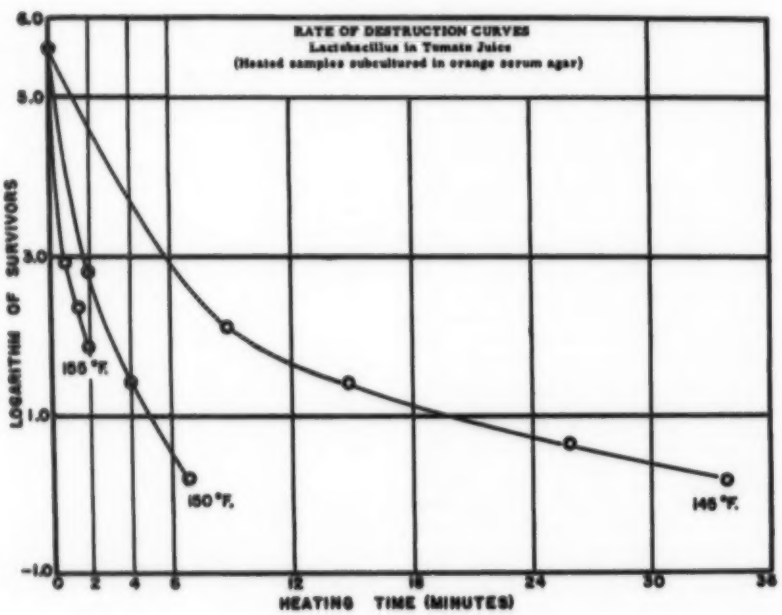
Many acid food products such as tomato juice, puree and paste, and fruit nectars and concentrates are "presterilized" before canning and filled sufficiently hot to kill spoilage organisms on the container and cover during a short holding period between closing and cooling. In fruit and tomato concentrates, bacteria of the genus *Lactobacillus* and certain yeasts are of primary concern. This is also true for unconcentrated fruit products with a pH below 4.0. A few interesting observations can be reported on the growth characteristics of spoilage organisms in tomato paste which are present as a result of container contamination or leakage. In yeasts, rapid spoilage occurs and a large amount of gas is produced, which is often sufficient to burst the can in less than a week after packing. If lactobacilli are present, however, gas is produced slowly and even a month after packing the cans are usually in low vacuum to soft swell stages. The spoilage bacteria are usually found on the surface of the product, where they form colonies, the interior of the paste being sterile, whereas yeast spoilage generally occurs throughout the product.

There have been no published reports as to the temperatures attained by the container surfaces during the holding period under various conditions, and the adequacy of these temperatures to prevent spoilage. The studies reported in this paper were made to evaluate the effects of commercial conditions on can surface temperatures as a basis for processing recommendations to the canning industry. The work was divided into three phases: (1) the determination of the heat resistance of significant spoilage organisms; (2) the investigation of factors influencing the temperatures of the can surfaces during filling and holding operations; and (3) a survey of the procedures used commercially and the can temperatures attained.

Heat Resistance of Spoilage Organisms

To determine the heat resistance of significant spoilage organisms, 16 cultures morphologically and culturally resembling lactobacilli, and one yeast culture were tested. These cultures were isolated from spoilage outbreaks investigated during the past four years. Most cases involved concentrated acid products, mainly tomato paste. Six of the cultures were discarded before the thermal death time (TDT) tests were made because of insufficient growth in culture. Of the remaining 11, the resistances in phosphate buffer at 150° F. were as fol-

FIGURE 1



lows: 4 isolates (including the yeast) survived 19 minutes, the longest heating time; 4 survived 14 but not 19 minutes; 1 survived 9 but not 14 minutes; 1 survived 4 minutes but not 9; and 1 failed to survive 4 minutes. The heat resistance of the *Lactobacillus* culture which showed the highest heat resistance in phosphate buffer was determined in tomato juice. A recovery (or subculture) method was used and the resulting data did not plot as straight line death rate (D) curves (see Figure I).

Other tests on the yeast and two *Lactobacillus* isolates and a composite of the other isolates in both tomato juice and paste indicated that these organisms were only slightly more resistant in paste than in juice. The resistance could be described for both products as an average z of 10 and a maximum F_{150} of 6.3. In general terms it would require 63 minutes at 140° F., 6.3 minutes at 150° F. or 0.63 minute at 160° F. to destroy the organisms in numbers in the range 100,000 to 1,000,000. These processes are only slightly higher than those recommended for the pasteurization of milk (see Figure II).

It should be realized that the resistance value of 6.3 minutes at 150° F. is for these organisms suspended in juice or paste. If the organisms are adhering the inside surface of the can or cover, they may not come in contact with the product and the resistance might be better characterized by that for the phosphate buffer, namely more than 19 minutes at 150° F.

Heating Characteristics of Can Surfaces

Two methods were used to determine the temperature of can surfaces during washing, filling, sealing, and holding. The first involved the use of thermocouples soldered to the inside of the can or cover. The thermocouple wires were led through a selector switch to a potentiometer which gave direct temperature readings. The second method utilized a surface temperature pyrometer having a range of 60° to 220° F. Temperatures measured by this pyrometer were in close agreement with those measured by the thermo-couples, and consequently the pyrometer was used in the cannery survey.

On the basis of thermocouple readings, the coldest area on the can surface for conduction heating products in cans held upright and stationary was at the top double seam. This temperature averaged about 10° F. lower than the center lid temperature.

Washing Empty Cans

It is a common practice to wash the empty cans with hot water or to blow them out with steam. The cans are usually inverted during this operation and may travel some distance in this position after being washed. The surface temperatures of a No. 10 can were determined during various washing procedures in steam and in water at 195° F. The lethal effects of the washing systems were $F_{150} = 20$ for a 3-second water wash, and $F_{150} = 0.7$ for a 3-second steam wash, indicating that hot water heats the cans more effectively than steam.

Filling Procedures

The product is usually filled at a temperature of 195° F. or higher. No. 10 cans filled with concentrated products travel for 15 to 45 seconds before the lids are placed on them

FIGURE II

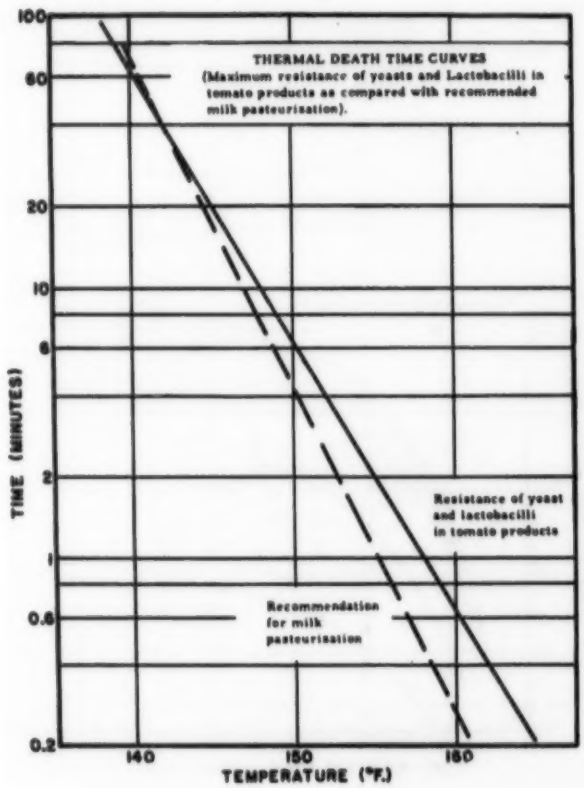
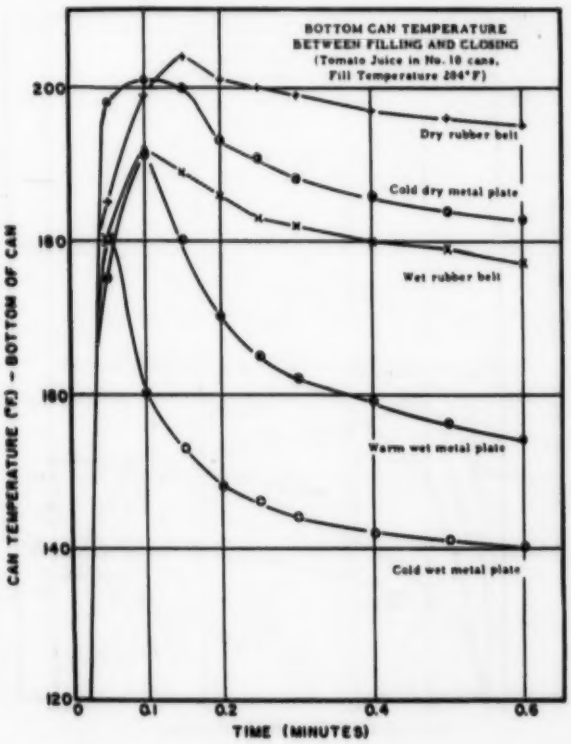


FIGURE III



and the closure made. For juices in 46-oz. or 12-oz. cans, the travel time between filler and seamer is 3 to 10 seconds. During this period the temperatures of bottom ends of No. 10 cans filled with tomato paste and tomato juice were measured (see Figures III and IV). The lethal effects during the first 30 seconds after filling tomato paste at 200° F. range from 0 to 2 minutes at 150° F. if the can is held on a wet metal or rubber surface. For juice filled at 204° F. and cans held on wet metal, the minimum lethal effect was found to be $F_{150} = 25$ in the first 6 seconds after filling.

TABLE I

Temperature Differentials Between Product, Headspace and Lid

Product	Holding time between filling and sealing (min.)	Comments	Temperature differentials, °F			Maximum lid temperature for 200° F. fill (°F.)	Time required for lid to reach stable** temperature (min.)
			Product and headspace	Headspace and lid	Product and lid		
Water	0*		3–4	7–8	11	189	1.0
Water	5	Outside of lid wet with water	4	8	12	188	1.5
Tomato juice	0		23	7	30	170	1.5
Tomato juice	5		34	9–10	44	156	1.5
Tomato juice	7		30	6–7	36–37	163	1.5
Tomato paste	0		20	10	30	170	1.5
Apricot concentrate	0		20	12	32	168	1.3

* Cans closed immediately after filling. ** Within 3° F. of maximum.

Closing and Holding Procedures

When the filled can reaches the seamer, a lid which has received no previous heat treatment is placed on it and the closure made. Holding the cans upright and stationary after sealing resulted in the temperature differentials shown in Table 1.

Tomato juice and concentrates, and fruit nectars and concentrates heat principally by conduction when the cans are conveyed in an upright position without agitation. The difference between headspace and product "fill" temperatures was found to be about 20° F. when the cans were closed immediately after filling. The difference between lid and headspace temperatures was 6° to 12° F.

A series of tests was made to determine what conditions during the filling and holding period influence the temperature of the can surface. No. 10 cans with thermocouples soldered to the inside surfaces were used. The cans were filled with apricot concentrate at 200° F. and, unless otherwise noted, were held stationary. The data presented in the Figures are averages of 2 to 3 tests, unless described as temperature range.

The lowering of the can surface temperatures appears to be in direct proportion to the lowering of the fill temperature. In other words, a 10° F. drop in fill temperature results in a 10° F. drop in can surface tempera-

FIGURE IV

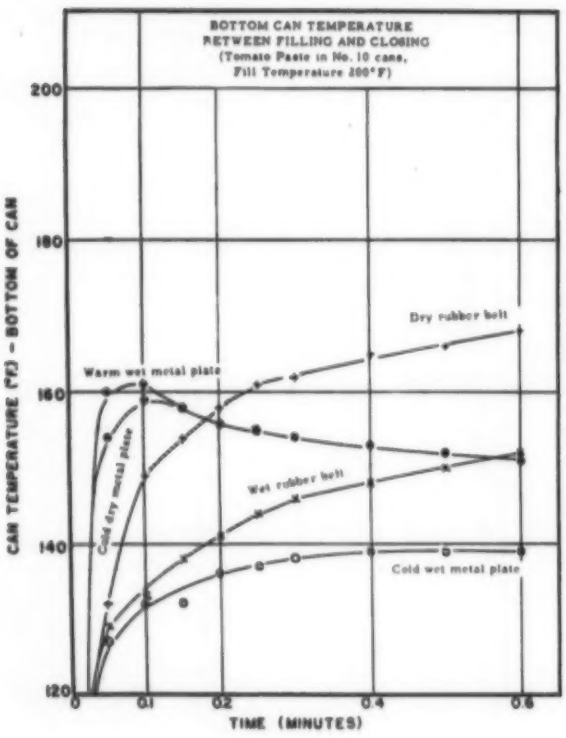
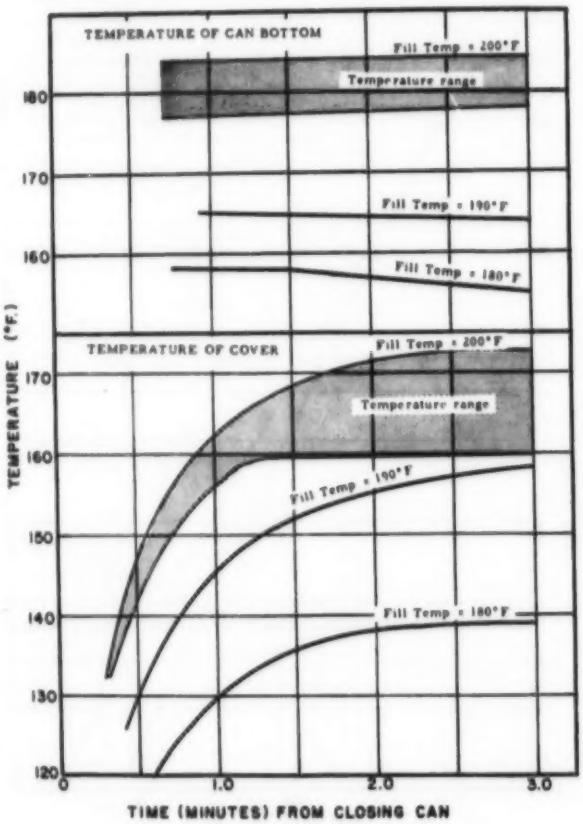


FIGURE V

Effect of Fill Temperature on Can Surface Temperature

(Cans filled with apricot concentrate and held upright after closure)



ture both for the surface in contact with the product and that in contact with the headspace bubble (see Figure V).

No. 10 cans were filled with apricot concentrate to headspace levels of 10, 22 and 33 thirty-seconds inch. Assuming 10/32 to be the normal fill, the larger headspaces were found to influence the temperature of the can ends above the headspace mainly by reducing the rate at which that surface reached a stable or maximum temperature. Similarly, if the inside of the lid, before it was placed on the can, was wet with cold water or cold product, a slower rate of heating the lid resulted (see Figure VI).

Both the rate at which the lid heated and the maximum temperature reached by the lid were lowered by holding the can after filling and before closure for more than a minute (see Figure VII). Such a condition may occur in event of a seamer breakdown.

In some canneries a slow, continuous flow of water is directed over various parts of the seaming or can handling equipment to prevent caking of the product on these surfaces. This water may splash on the sealed can and form a small puddle on the lid, which was found to rapidly reduce the temperature of the can surface in contact with it (see Figure VII).

After a can has been filled with paste or fruit concentrate and sealed, it must be washed before the spilled product dries on the outside. For tomato juice or fruit nectar, washing the can immediately after seaming is not essential because adequate washing occurs in the cooling water. The temperature of the water used to wash cans of concentrate was found to be as high as 205° F. in some canneries and as low as 65° F. in others. Laboratory tests showed that this washing procedure has a marked influence on the temperature of the can surfaces in contact with the product and those above the headspace. The cans in these tests were filled, sealed, and held upright during and after the wash. However, immediately after washing they were tipped to remove the excess water and then returned to the upright position. Cold water washing was found to lower the temperature of the can surface 35° to 40° F., while hot (200° F.) and warm (140° F.) wash water lowered the surface temperature about 20° F. (see Figures VIII and IX).

Holding the cans in an upright position after washing is probably the most unfavorable condition for heating of the can surface. Most canners invert or roll the cans after washing to rid them of the excess water and this usually results in higher surface temperatures.

Laboratory experiments, the data from which are presented in Figure X, have shown that the influence of the belt materials on can surface temperatures during the holding period is similar to that during the filling operation. The following materials are listed in order of their increasingly adverse effect on the temperature of the can surface in contact with them:

Material	Drop in Surface Temperature, °F.
Still air	0
Dry rubber	4
Dry metal	16
Wet rubber	30
Wet metal	54

During the holding period the cans may travel along a conveyor which is exposed to air currents or may enter the first section of a forced air evaporator cooler, a type which utilizes the cooling effects of evaporation of a surface film of water to cool the cans.

FIGURE VI

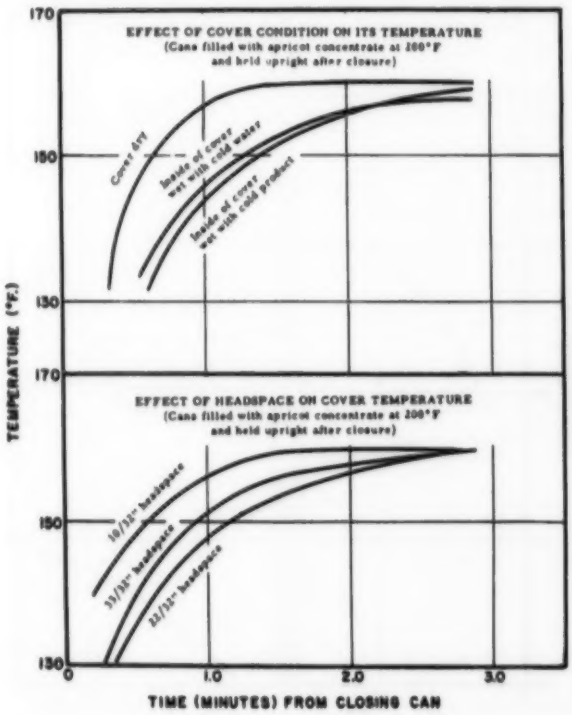
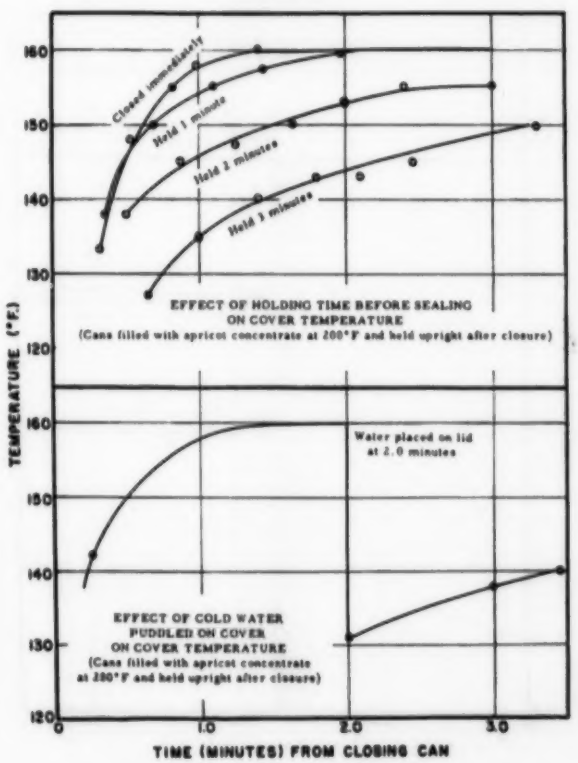


FIGURE VII



This first section of such a cooler may be free of water, but may still have strong air currents directed on the cans, which considerably influence the temperature of the can surface in contact with the product and of that in contact with the headspace bubble. The results of directing strong air currents on a stationary can are presented in Figure XI and show that the temperature of the can surface in contact with the product is lowered about 22° F., while that of the surface in contact with the headspace bubble is lowered about 47° F. during a 2-minute exposure.

The influence on can surface temperatures of inverting and rolling No. 10 cans of conduction-heating products was investigated. Inverting the can on a dry, slow heat-conducting surface resulted in an increase in temperature of the canner's end and a decrease in temperature of the can company end. If the can is rolled during the holding period the main benefits appear to be the removal of excess wash water from the can and minimizing the area of the can in contact with the surface of the conveying system (see Figures XII and XIII).

To determine if the juices and nectars would transfer heat more rapidly to the container than would the concentrates, No. 10 cans of tomato juice and tomato paste, filled at 200° F. and sealed, were washed with cold or hot water with the cans rolling during and after the wash. The temperatures of the can surfaces, both end and side, were taken during this time (see Figure XIV). It can be seen that for the more fluid product, tomato juice, movement of the can results in agitation of the product and a higher and more uniform surface temperature. For the less fluid product, tomato paste, product agitation does not necessarily occur with can movement and much lower can surface temperatures result.

A duplicate test was made with No. 2 cans and similar results were obtained (see Figure XV).

Occasionally cans coming from the filler are slack filled. The operator may then pour the product from one can into others to complete the fill. The influence of this topping operation on the can surface temperature was investigated. The cans were filled to about 1 inch headspace with product at 200° F. They were then topped with product at 180° and 160° F. and closed. It was found that pouring the cooler product into the partially filled cans so that some mixing occurs has little or no influence on the cover temperature, while layering the product on top of the material already in the can lowers the cover temperature.

Survey of Commercial Procedures

A survey of 16 canneries was made during the 1953 tomato season in order to compare the surface temperatures from the laboratory studies with those of cans filled, sealed and held under commercial conditions. The temperature of the product at the filler was 195° F. to 202° F. for tomato paste, and 195° F. to 208° F. for juice. The temperature of the water used to wash the cans immediately after sealing was 65° F. to 205° F. The sealed cans were usually turned on their sides and rolled after washing to rid them of excess water. Cans of tomato juice and vegetable juice cocktail were held after sealing for approximately 1 to 3 minutes before water cooling, while the cans of tomato paste were either air cooled or held at least 4.8 minutes before cooling with water. This last fact is significant, because a 3-minute holding period between sealing and cooling the cans had been considered adequate for container sterilization for both juices and concentrated products. Of 11 packers of

FIGURE VIII

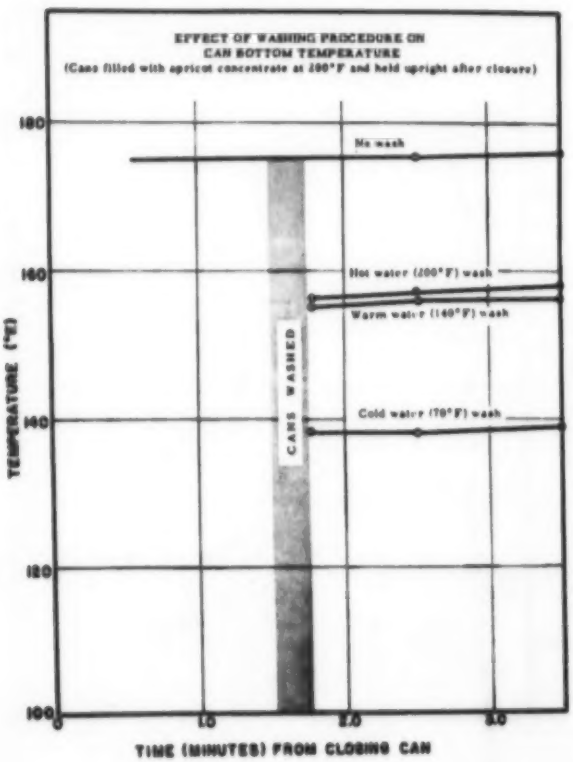
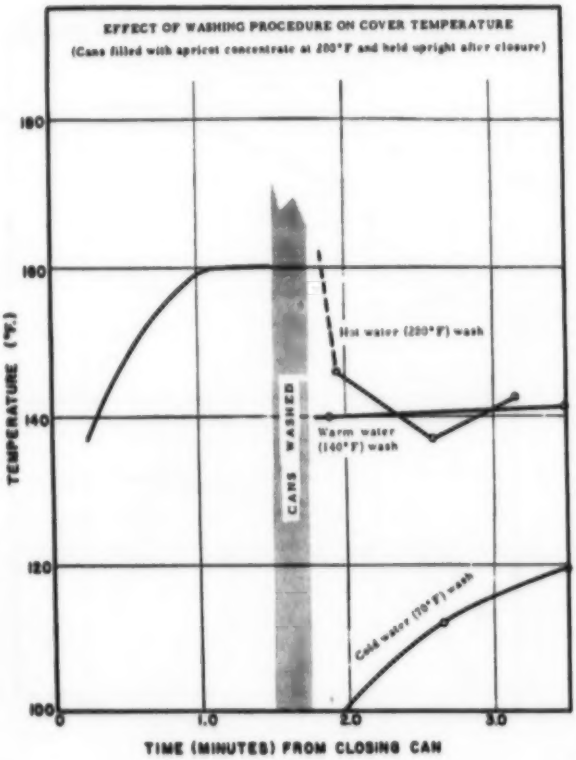


FIGURE IX



tomato paste, 7 were air cooling the No. 10 cans; 2 of these processed the cans 2 minutes at 200° F. before air cooling; and the 4 packers who were not air cooling were holding the cans 4.8 to 12 minutes before water cooling. The calculated lethality of the heat treatment of the can surfaces was 12 to 83 minutes at 150° F. for the cans of paste not air cooled, and 25 to 800 minutes at 150° F. for those air cooled. If a 3-minute hold were used for these cans, the lethality of 5 of the 9 processes investigated would be between 3.2 and 10 minutes at 150° F. These five systems included all those using cold water to wash the cans immediately after closing.

When filled with tomato juice, all cans attained a temperature during the holding period of at least 170° F., and the following were the temperature ranges: 404 x 700 cans, 160° to 183° F.; 211 x 414 cans, 162° to 179° F.; and 202 x 308 cans, 145° to 184° F. For tomato paste in No. 10 cans the range was 145° to 175° F. with, in some cases, 154° F. being the maximum temperature the can surface attained. These temperatures are in close agreement with those of Figures XIV and XV which were obtained by laboratory experiments. For tomato juice, the calculated lethalities of the heat treatments at the can surfaces were more uniform and more severe than for the tomato paste even though far shorter holding times were used. This indicates that some agitation in the container occurs for this more fluid product.

Discussion

Products packed by hot fill, hold and cool procedures can be divided into two groups, (1) those that are capable of being agitated by movement of the can and (2) those where product agitation does not necessarily occur when the can is moved. The first group includes tomato and fruit juices and nectars, while the second includes tomato paste, fruit concentrates, apple sauce, and preserves. Cans of juice and nectar are usually handled in such a way as to obtain agitation, which results in exchange of the surface layer of the product with the hotter material toward the center of the can, and consequently in relatively high can surface temperatures. It follows, then, that any condition which leads to cooling of the can surface is not as critical for the first group of products as it is for the second group.

There are certain conditions during the filling and holding periods which exert considerable influence on the can surface temperature for these two groups of products. For the first group they are as follows:

Factors considerably lowering can surface temperatures:

- Low product temperature at filler
- Wet metal belts
- Failure to agitate can and contents

Factors moderately lowering can surface temperatures:

- Strong, cold air currents
- Dry metal or wet rubber belts
- Cold water washing of closed cans

For the second group of products, those that are less fluid, the conditions which tend to lower can surface temperatures are as follows:

Factors considerably lowering can surface temperatures:

- Low product temperature at filler
- Wet metal or rubber belts
- Strong air currents
- Cold water washing of closed cans
- Warm (above 140° F.) and hot water washing of closed cans (not as objectionable as washing with cold water)
- Failure to remove excess wash water from can surface

FIGURE X

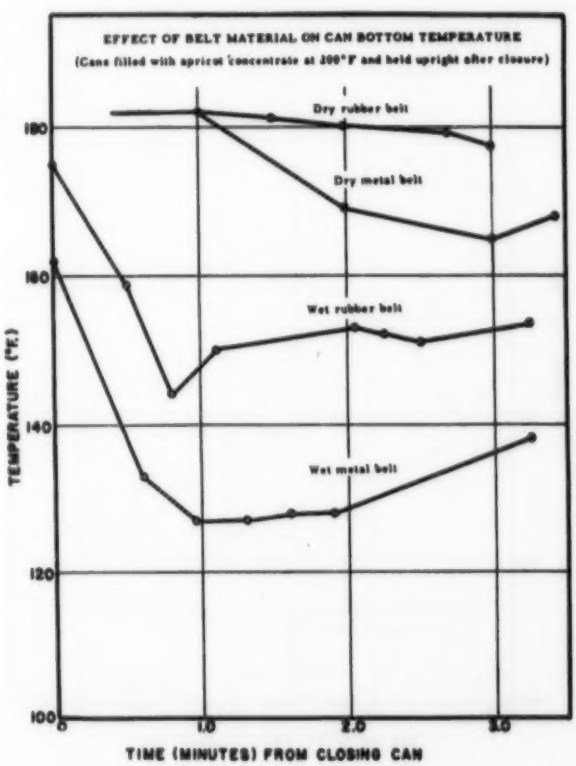
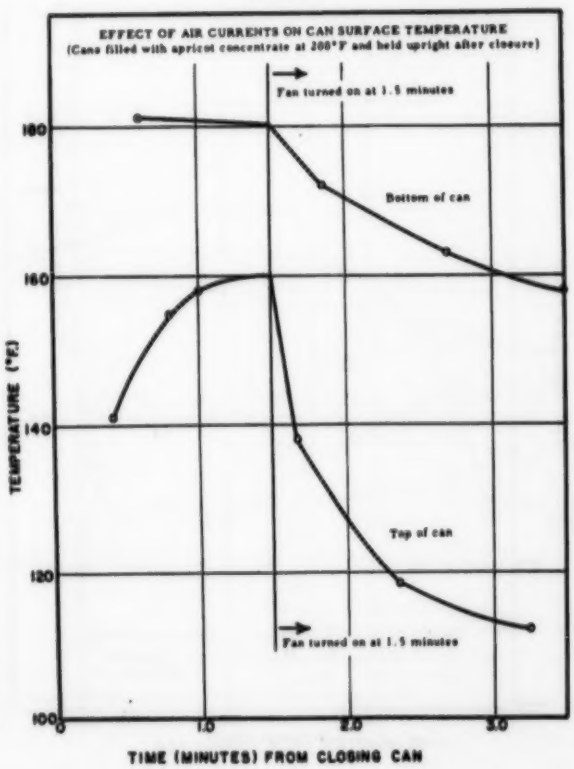


FIGURE XI



Factors moderately lowering can surface temperatures:

Dry metal belts

Holding the cans opened for more than 1 minute between filling and seaming

"Topping" partially filled can with product at lower temperature than that already in can

Wet surface of closed cans or wet surface of lids before closing

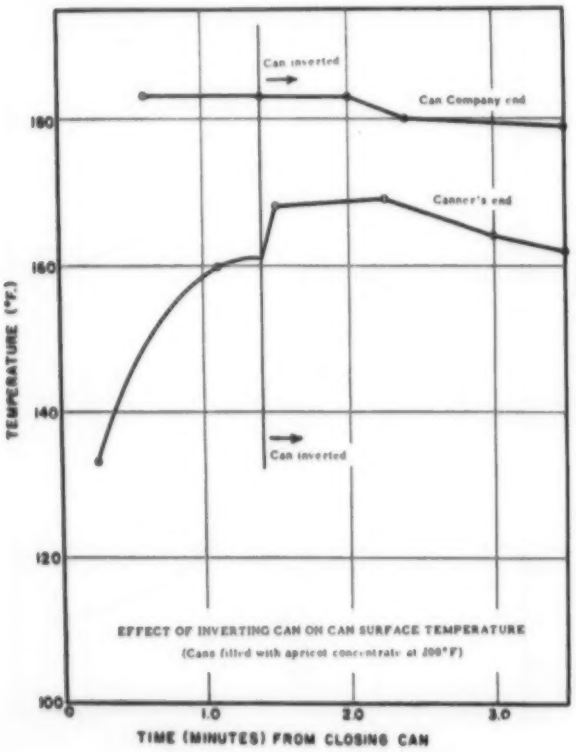
Factors having little or no influence on can surface temperatures:

Headspace (up to 1 inch)
Dry rubber belt or wooden pallet

After a closed can has been washed and the excess water on the surface has been drained off, 1 to 3 minutes are required for the hot metal to completely evaporate the water remaining on the can. During this time the surface of the can is colder than it would be if the can had not been washed. Accordingly, for juices and nectars which are water cooled after the hold, it would be better not to wash the cans before the hold but to utilize the cooling water for washing. It is realized that for paste and concentrated products it is necessary to wash the can immediately after sealing because spilled product is exceedingly difficult to remove after it has dried on the can. If the temperature of the wash water for the canned concentrates is below the temperature of the tin plate, cooling of the product surface takes place and a longer time is required to evaporate the water from the can surface. On the other hand, if the temperature of the wash water is equal to or higher than the temperature of the tin plate, the only cooling which occurs is that associated with the evaporation of the water from the can surface. This cooling by evaporation is appreciable. The temperature of can surfaces was found to be about 20° F. lower after cans of apricot concentrate were washed with warm or hot water, and 35° to 40° F. lower after cold water washing, than if the cans were not washed. These lower temperatures, both from the cold and hot water washing, are maintained during the period when the water is evaporating from the can surface. After the water has evaporated, the surface temperature will increase at a rate dependent on the factors influencing the transfer of heat from the interior of the product to the surface layer, and from the surface layer to the metal. If a 3-minute hold is used for concentrated products, then practically all of this time will be required for evaporation of water.

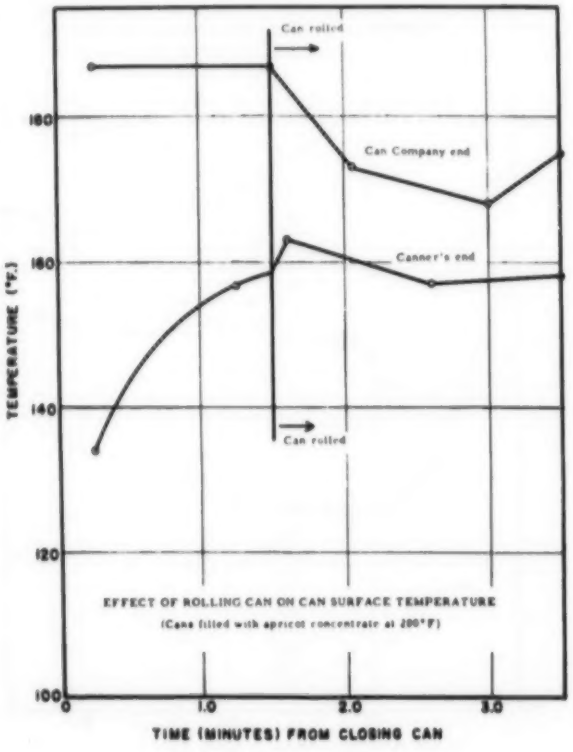
Following the washer, if the canning line as it has been installed will not accommodate rolling cans, the decision must be made whether or not to invert the cans. This decision should be based on the washing procedure and the type of carrier system. For example, if the can travels on its side through and a short distance beyond the washer, the excess water will drain off. Under most circumstances the bottom of the can has already received a significant heat treatment from the empty can washing procedure and during the filling and closing operation, while the canner's end has received no appreciable heat treatment. If, after washing, the can is to be placed on end on a rubber conveyor belt, care should be taken to keep the belt as dry as possible and to avoid entrapment of water between the belt and can. If the belt is wet, maintaining the can with the canner's end up is preferable. If the belt and can are dry, inverting the can would result in a higher temperature of the canner's end. For metal web belts

FIGURE XII



EFFECT OF INVERTING CAN ON CAN SURFACE TEMPERATURE
(Cans filled with apricot concentrate at 200°F)

FIGURE XIII



EFFECT OF ROLLING CAN ON CAN SURFACE TEMPERATURE
(Cans filled with apricot concentrate at 200°F)

inverting is preferable unless there is excessive water on the can and belt. For solid metal carrier plates, conveying the can with the canner's end up would probably result in a higher surface temperature of the canner's end. If the can is to be placed on wooden trays or pallets for air cooling, inverting is preferable. Placing an empty tray or pallet over the top layer of cans in a stack to be air cooled minimizes the effect of strong, cool air currents.

Recommendations

Based on the thermal death time studies and on commercial experience, a minimum heat treatment of the can surfaces after closure equivalent to at least F_{120} of at least 20 is apparently necessary. To assure that at least this lethality is attained, the following recommendations are made for "presterilized" products handled by hot fill-hold-cool procedures. It should be pointed out that these recommendations would not be sufficient to destroy spores of acid-tolerant organisms:

For tomato juice, fruit juices and fruit nectars packed in 12-oz. or larger cans, a 3-minute hold between sealing and water cooling is adequate provided the following conditions are met during filling and holding:

(1) The temperature of the product at the filler is at least 200° F.

(2) Preferably no can washing immediately after closure; if such washing occurs, the temperature of the water should be at least 160° F.

(3) The cans are rolled, rocked or inverted during part of the holding period so that agitation of the contents can take place and excess water, if any, can drain off.

(4) Cans are not placed on wet solid metal plates or wet rubber belts, and are not exposed to strong, cool air currents.

For highly viscous products, such as tomato paste and fruit concentrates packed in cans larger than 303x406, the following alternative procedures are recommended:

(1) Fill the product at 195° F. or above. After closing, wash the cans with water above 160° F. Pass the cans through a water or steam cooker maintained at 180° F. or higher for a minimum of 2 minutes, and water cool.

(2) Fill the product at 200° F. After closing, wash the cans with water above 160° F. and roll the cans to rid them of excess water. Hold the cans 5 minutes if the site for holding is enclosed, or 8 minutes if it is not enclosed. In either event the site for holding should be as free of strong air currents, water vapor and wet surfaces as possible and care should be taken to avoid entrapment of water under the can if it is held on end. Water cool.

(3) Fill the product at 195° F. or above. After closing, wash the cans with water above 160° F. Roll the cans to rid them of excess water. Invert the cans on wooden pallets or trays, place an empty pallet or tray on top of the upper layer of cans, and air cool.

All these products packed in cans smaller than 211x414 for tomato and fruit juices, and 303x406 for tomato and fruit concentrates and filled at 190° F. or above, should receive an "in can" process of at least 2 minutes at 195° F. or the equivalent until further data are obtained on the smaller can sizes.

FIGURE XIV

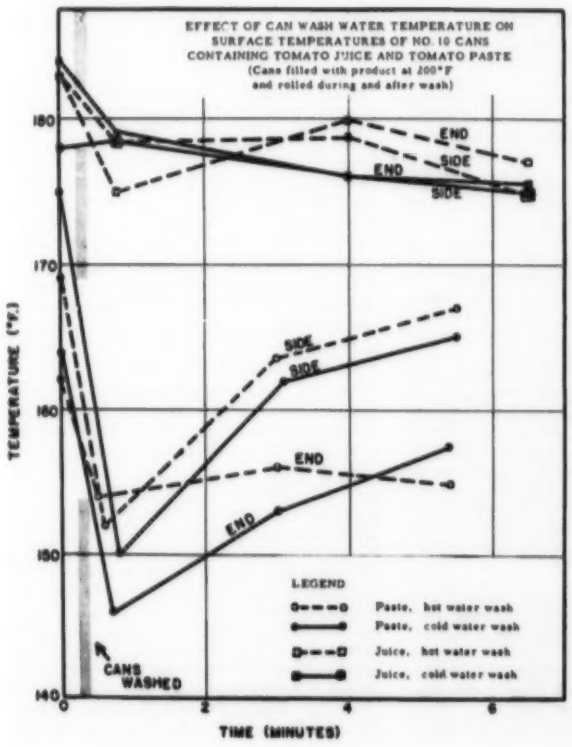
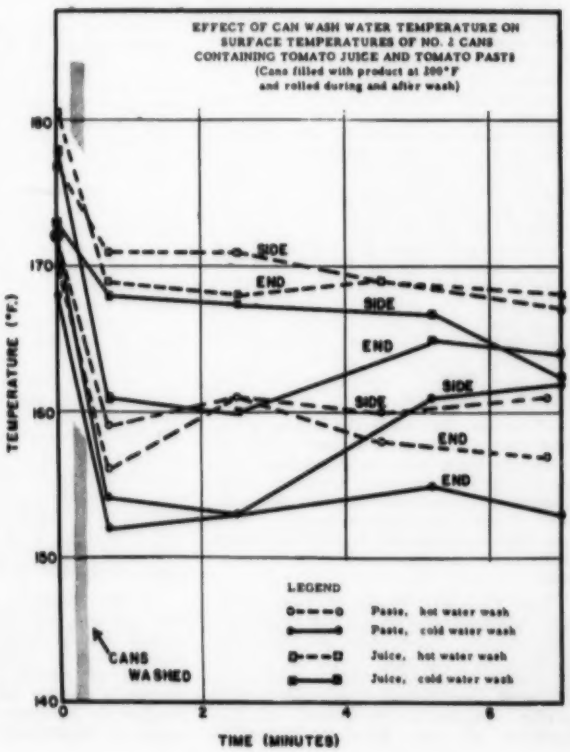


FIGURE XV



FOOD REGULATION

The Status of Pesticide Legislation

By J. Harry Covington,
Office of Counsel,
National Canners Association

Most laymen no doubt believe that the spittlebug leafroller, plum curculio and pineapple mealy bug would be of interest only to insectologists and that chlorinated hydrocarbons and dithiocarbamates are but rarely mentioned outside of chemistry classrooms. The fact is, however, that these and many other entomological and chemical terms are as familiar to many of you as the names of your competitors' best selling brands of canned foods. You are too well aware that a high grade canned product is dependent upon a raw material of superior quality to ignore any aspect of the production of canning crops.

Your study and increased knowledge has made it quite apparent that the insect world would fare far better than the consuming public in its eating habits if it were not for the wide variety of chemical pesticides currently employed. Inescapably then you are concerned with any legislation affecting the use of these chemical pesticides.

Some alarmists now say that the American public is being slowly poisoned. Whether any real apprehension on the part of the consuming public has stimulated legislative activity in this field, or the Congressional concern emanates from the numerous administrative hearings and legislative inquiries, is a difficult question to answer. Admittedly, a vast number of new insecticides and fungicides were developed during and immediately following the war. Their use in turn brought about the lengthy hearings conducted by the Food and Drug Administration in 1950 to establish tolerances for poisonous residues in or on fresh fruits or vegetables. These administrative hearings unquestionably gave impetus to the demand for new and tighter legislation covering chemicals in foods.

Close on the heels of these Food and Drug Administration pesticide hearings were those conducted in Congress, by the so-called Delaney Committee, to investigate the broader subject of all chemicals in foods. These hearings culminated in reports which definitely recommended new legislation.

The National Canners Association has followed closely all of these developments. Last year at the Convention in Chicago your Board of Directors, sensing the imminence of new legislative proposals that might require a statement of the position of the canning industry, created a committee known as the Special Committe on Chemical Additives in Foods. The purpose of this Committee was to keep itself constantly informed and to make recommendations to the Association when required.

It is not my intention today to review all of the earlier bills which were introduced to regulate chemicals in foods. Suffice it to say that most of them lumped pesticides with all other added chemicals in single legislative proposals.

The agricultural groups and the pesticide manufacturers, however, were particularly anxious for early action; they wanted announced tolerances for pesticides and they wanted them soon. Accordingly they succeeded in having pesticides separated from other chemical additives for legislative purposes.

Last March Representative Miller introduced two bills in the House—one H. R. 4277, dealing with pesticides—the other H. R. 4901, dealing with other chemical additives. It appears likely that a revised version of this Miller pesticide bill may be enacted into law early in this session of Congress.

For a proper understanding of the Miller pesticide bill and the N.C.A.'s position in relation to it, a brief mention should be made of the existing provisions of the Federal Food, Drug, and Cosmetic Act which permit regulation of added chemicals in foods and, indirectly, the use of pesticides.

The Act, as you know, prohibits the shipment in interstate commerce of adulterated foods. Section 402 of the Act delineates the various ways in which foods may be adulterated. Subsection (a) (1) of Section 402 provides that a food is adulterated if it bears or contains any poisonous or deleterious substance which may render it injurious to health. Subsection (a) (2) provides that a food is adulterated if it contains any added poisonous or deleterious substance which is unsafe within the meaning of Section 406. Section 406 in turn provides for the establishment of tolerances for poisonous or deleterious substances which cannot be avoided in good manufacturing practice. It is under this section 406 that the residue tolerance hearings were held in 1950.

In the absence of any tolerances and, as you will remember, none has as yet issued, proceedings for adulteration must be brought under Section 402 (a) (1), with a showing that the pesticide residue found in a food may render it injurious to health. This point is important for you as processors to remember for, as I shall shortly develop, it will continue to apply to you even after the new pesticide chemical legislation has passed.

The Miller pesticide bill as introduced separated pesticide chemicals from other added chemicals under Section 402 (a) (2). It specified that any food will be adulterated if it contains any pesticide chemicals, unless they had either been exempted from the necessity of a tolerance or a tolerance had been established under a new section to be added to the Act. This new section, to be numbered 408, would set up a regulatory scheme whereby pesticide manufacturers could secure consideration by the Food and Drug Administration, for tolerance purposes, of any pesticide chemical which had been registered with the Department of Agriculture under the Federal Insecticide and Rodenticide Act.

Briefly, it would provide that any person who had registered a pesticide chemical could file a petition with the Food and Drug Administration asking for the establishment of a tolerance. The Secretary would publish a notice that a petition had been filed. A petition would include full information about the pesticide, levels of use, toxicity data, analytical methods and the practicability of removing residues. The bill originally provided that all this data would remain confidential. At the same time, the petitioner was to file a copy of his petition with the Secretary of Agriculture asking that certification of usefulness of the pesticide be made to the Secretary of Health, Education and Welfare, this certification to include a statement as to the normal levels of use of the pesticide. Provision was made for the referral of the petition to an advisory committee if either the Food and Drug Administration or the pesticide manufacturer so desired. In addition, the Secretary could, on his own initiative, propose the issuance of a tolerance.

After certain periods specified in the bill the Secretary of Health, Education, and Welfare would be required either to exempt the pesticide or issue a tolerance. The tolerance could, however, be established at zero.

Within a specified period following the issuance of this regulation any adversely affected party was permitted to object and ask for a public hearing.

Last July brief hearings were held on the Miller pesticide bill by a subcommittee of the House Committee on Interstate and Foreign Commerce, during the course of which a number of suggested changes were presented. Following these hearings the National Agricultural Chemicals Association, representing both the views of the pesticide manufacturers and the grower groups, assisted the Congressional Committee staff in redrafting the bill. There were still a few areas of disagreement but most of these

would not be of concern to you as processors and there is no need to report them here.

The House Committee had suggested to the Food and Drug Administration that they cooperate with pesticide manufacturers in an attempt to formulate a draft that would be acceptable to both. Conferences were accordingly arranged between the representatives of the pesticide group and the Food and Drug Administration. One very important proposal emerged from these post-hearing discussions. The suggestion was made that the tolerances for pesticide residues established pursuant to the Miller pesticide bill apply only to raw agricultural commodities and that no provision of the amendment apply to processed foods.

It was apparent that this proposal was one of major interest to the canning industry.

A meeting of the N.C.A. Committee on Chemical Additives in Foods was called last November 30. At that time the latest version of the Miller pesticide bill was reviewed for the Committee and the proposal to limit its application to raw agricultural commodities thoroughly discussed. A subcommittee, consisting of Mr. Wakefield, Mr. Macklem and Dr. Mahoney, was appointed to explore, in conjunction with Association Counsel, a number of points with the Food and Drug Administration. The subcommittee reported back to the Committee on Chemical Additives in Foods. After further discussion the Committee recommended that the National Canners Association go on record as favoring a limitation of the application of the bill to raw agricultural commodities.

A number of considerations went into this decision. Primarily it has long been recognized that any published official tolerance is apt to be lower than an unofficial tolerance. Although tolerances would be established under the new Act on the raw materials used by canners, processed foods would in effect be in the same position as they are today. In the absence of a tolerance for pesticide residues in processed foods established under Section 406 of the Act, any charge that a residue level in any processed food made it adulterated would have to fall under Section 402 (a) (1). This would require a showing that the poisonous or deleterious pesticide in the food might render it injurious to health. It was recognized that in some cases the canner might be able to remove large portions of the residues but where this is not commercially feasible, it was difficult to see how the Food and Drug Administration could contend that a residue level in the processed product, no higher than permitted in the fresh or raw product, might be said to render it injurious to health.

The Association Committee, however, did not limit itself to this one point. It recommended incorporation of several other changes in the bill. The Committee felt it desirable that the analytical method available for the detection of a residue be made public at the time the Secretary published his notice of the filing of a petition. Next the members thought processors should be in a position to request of the Secretary of Health, Education, and Welfare that steps be taken to establish a tolerance with respect to residues on their raw material. An addition that the Secretary might act "on the request of any interested party" was recommended. The Association Committee wanted also to be sure that canners were considered adversely affected parties for the purpose of objecting to any proposed tolerance. Finally, the Committee asked that there should be assurance that when the grower has certified that the pesticide residues on the raw product do not exceed the legal tolerance, and the canner has employed good commercial practices, there could be no criminal prosecution of the canner based on the presence of excessive residues in the processed food. A recommendation was made that the Act incorporate such a guaranty.

These proposals were presented to the N.C.A. Administrative Council on the following day and approved by that body. Thereafter, members of the Laboratory staff, Dr. Mahoney, and Association Counsel had further conferences with representatives of the National Agricultural Chemicals Association and the Food and Drug Administration. During these conferences it was agreed that processors would clearly be considered adversely affected parties for the purpose of objecting to any proposed regulation but that this should be spelled out in the legislative history rather than in the bill itself.

With respect to the guaranty provision, the Food and Drug Administration officials felt that those contained in existing law were sufficient but that it might be made clear that they applied to the new Miller bill. Hence there has been incorporated in the latest draft of the Miller bill a definite statement that all guaranties provided in the present Food and Drug Act are applicable to raw agricultural commodities. Although this is not the complete form of guaranty we originally sought, it appears to be an acceptable compromise. They agreed to all our other recommendations.

A final proposal in the form of a clean bill has now been resubmitted by Representative Miller as H. R. 7125.

The most important thing to remember about the bill as submitted is that it would limit the application of the control measures provided, to raw agricultural commodities. With the two minor exceptions I have already mentioned, all of the other suggestions of the Association Special Committee were incorporated in the latest draft.

Two other changes from the original bill may interest you. The bill now provides that all data filed with a petition asking that a tolerance be established will remain confidential, only until a proposed regulation is issued. The composition of the advisory committee, to which a petition may be referred, has been changed from something resembling an arbitration board, with members from both sides, so that now it will be appointed entirely by the National Academy of Science.

Except as to some of the time periods specified, the procedure for obtaining a tolerance provided in H. R. 7125 follows that spelled out in the earlier Miller pesticide bill.

It is expected that H. R. 7125 will be enacted in substantially the same form as introduced—possibly without further Congressional hearings.

You may well ask how the bill will affect you as canners.

After the effective date of the new legislation, the practical result will be that no pesticide which leaves any residue will be used unless a tolerance has been established. The various state agencies in making their recommendations for spraying programs will of necessity take into account all established tolerances. Professional sprayers will attempt to see that their applications result in residues within permitted levels. Growers presumably will make every effort to see that the tolerances prescribed for the raw commodities are not exceeded. Nonetheless, as a precaution you should attempt to secure from your growers a guaranty to the effect that the tolerances are not exceeded on the raw material.

In some instances you may be able to reduce the resulting residue in the course of processing. Every effort should be made to effect such diminution. Where it is not feasible, however, and some pesticide residues remain in the processed product, your products will be judged, so to speak, by the standard of the present law which will remain unchanged. The amount of pesticide residue remaining in the processed food must not be of such an amount as may render the food injurious to health. In meeting this standard, as I have already pointed out, it is difficult, if not impossible, to conceive that a residue level in the processed food, which it is impractical to remove, and is no higher than that permitted on a raw agricultural product as it goes to the housewife, can be said to render the food injurious to health. No one has yet suggested that the human body can distinguish between an organic pesticide on a fruit or vegetable straight from the orchard or truck garden and that which may spend some time in a metal can.

The Future of Mandatory Food Standards

**By H. Thomas Austern,
Chief Counsel,
National Canners Association**

In venturing this biennial report on mandatory federal food standards, I am reminded of the curious lady who recently approached Dr. Albert Einstein at a Princeton tea and asked, "Professor, do you think atomic weapons are here to stay?"

"Madam," replied Einstein, "the more important question is—are we?"

Unless adequate federal budget funds are forthcoming, any future report on the development of standards of identity, quality, and fill of container may well be only an unmelodic requiem.

For under the considerably reduced FDA appropriation for the present fiscal year ending June 30, 1954, continued work on food standards has already been seriously curtailed. The number of administrative employees dealing with them has been reduced. Personnel in the Food Division, which does the underlying research work, has been diminished as has the Department's legal staff. At the moment there is but one part-time Hearing Officer to cope with the entire program. Any further reduction in the next Congressional appropriation may well result in the necessary cessation of all work on food standards.

No one can criticize the FDA officials for this condition. Necessarily, the rule of first-things-first means that limited funds must initially be devoted to enforcement activities in situations affecting the public health, to curbing the harmful adulteration of food, and to factory inspection which is considered so important in the control of possibly insanitary conditions. Put another way, the available funds are first utilized for the protection of health and only the remainder applied to protection of the consumer pocketbook. Certainly, there would be little warrant in devoting costly time and effort to the promulgation of any new economic regulations if existing statutory requirements were not adequately enforced.

Nevertheless, the curtailment—and most certainly the threatened complete cessation—of administrative activity in the standardization of foods has consequences that ought to interest the canning industry.

In the first place, there are a good number of standards still in the mill in whose completion and final promulgation important branches of this industry are vitally interested. Included among these proposed regulations on which administrative consideration remains uncompleted are standards of fill for canned corn; standards of identity, quality, and fill of container for canned pineapple; and the pending application to amend the catsup standard. In these proceedings both the industry and the FDA have invested massive amounts of time and effort and not inconsiderable sums of money.

In addition, there are under preliminary consideration a number of standard proposals on which canning industry groups have extensively worked. Here again much time and effort have been spent; and in some instances research techniques, assembled data, and tentative conclusions have been extensively explored with the Food and Drug Administration.

Far more important, however, are the congeries of problems posed by the existing standards. Technology in the canning industry is dynamic. Canning methods and product development are seldom if ever static. Our experience since 1938 has taught us that the ready amendment of existing canned food standards is essential to continued development.

On its part the FDA has cooperated splendidly in scheduling proceedings to amend any one of the more than 50 existing mandatory standards for canned foods. Lack of ability because of budget inadequacies to continue this record of accomplishment will have serious consequences. It may forestall the lawful commercial marketing of many improvements now on the horizon. It may also threaten the utility, if not the integrity, of the entire standardization program.

Nevertheless, there is not too much hope for the immediate future. For the current fiscal year Congress gave the FDA $5,200,000 for its entire enforcement program, excluding the certification activities that are carried by their own fees. The proposed federal budget, announced last Thursday, recommends that Congress appropriate only the same sum for the next fiscal year, and Congress is not likely on its own to increase the President's request.

This situation has awakened many of those interested in the standardization program—and should enlist the attention of all canners whose products are subject to already promulgated FDA standards—in possible measures to alleviate these problems. Fortunately, there are at least two avenues which would appear not to be foreclosed by even the present closely limited administrative budget.

In the first place, there remains available the so-called experimental shipment of foods which do not conform to the existing standards. You will recall that in October, 1949 the FDA was persuaded to issue what it calls a Statement of Policy—but which is in effect a regulation—that authorizes the issuance of permits permitting the interstate shipment of any standardized food containing any new ingredient not recognized in the standard (See INFORMATION LETTER No. 1256, page 318).

In terms, this Statement of Policy is merely responsive to the recognized need for testing in interstate markets the usefulness and consumer acceptance of any standardized food containing a new ingredient. In practice, the administrative discretion has been intelligently and sensitively exercised to permit the marketing under permit of different forms of pack as well as of products containing new ingredients. More recently, both the Food Standards Committee of the New York State Bar Association and the Committee on Food Standards of the Food and Nutrition Board of the National Research Council have urged the liberalization of this permit procedure to embrace "any useful modification" of a standardized food.

Permissive marketing under this type of temporary permit is of course no ultimate solution. The technique presupposes that eventually the existing standards will be amended, or where necessary new standards promulgated. Moreover, the administrative discretion is unfettered, and the FDA can condition the issuance of a permit on particular types of label disclosure or other requirements deemed necessary. The safeguards of the required public hearing and the court review provisions of the Act are not available. Still the permit procedure is desirable and has been very helpful in avoiding undue rigidity.

Another means of relief appears to be in sight in the Hale bill, H. R. 6434, passed by the House on the last day of the last session of Congress and now pending before the Senate Committee on Education and Public Welfare. You will recall that Secretary Hobby spoke of the need for this measure at the N. C. A. Annual Meeting yesterday.

The Hale bill was drafted and sponsored by the Committee on Food Standards of the New York State Bar Association. It has been endorsed by the FDA, by the National Canners Association, and by other food industry groups. There was no opposition to it. Essentially it provides that a mandatory food standard may be issued, amended, or even repealed without a public hearing where there is no controversial issue.

Either the government or any interested person may propose the issuance or amendment of a standard. The Secretary of Health, Education, and Welfare, within whose jurisdiction the FDA falls, thereafter formulates and publishes a proposed standard. Unless an adversely affected person files objections within 30 days, the proposed standard becomes effective.

If anyone desires to object he must specify with particularity the por-

tions of the proposed standard he thinks improper, state his grounds for objecting, and request a public hearing. The public hearing is then limited to the issues raised by the objections.

It is hoped that the Hale bill will be speedily enacted. Many believe that it will contribute measurably to solving the problem of necessary amendment of existing standards without recourse to time-consuming public hearings. What its ultimate effect may be on the ready issuance of additional regulations embodying wholly new standards is less certain. At a minimum it will avoid the necessity for lengthy public hearings on collateral or background questions concerning which no one is in disagreement. But only where no controversial issues arise on the proposed amendment will a public hearing be wholly avoided.

Manifestly, restraint in pressing extreme positions will be called for both on the part of the FDA in what it publishes as the proposal, and on the part of the industry groups in what they insist upon questioning. Failure to avoid polar positions will in every instance precipitate a public hearing, the holding of which may in many cases be delayed and in most instances prove costly.

If the Hale bill is enacted at a reasonably early date, it is not unlikely that its utility can be tested on some of the current proposals to amend canned food standards, possibly including the pending one to amend the standard of identity for catsup to permit the inclusion of corn syrup as an optional ingredient.

Of course, neither the use of so-called experimental permits nor the Hale bill will afford any comfort where there is a complicated standard proposal raising basic controversial issues on which it becomes necessary to hold a public hearing.

Nevertheless, the application of administrative expertise in two areas will be helpful. One is a question of legal interpretation to limit those who can object, and thus precipitate a hearing, to persons directly concerned with the proposed regulation. The other area is one of internal administration in the formulation of what is issued as the proposed standard.

I have never thought that the consideration of a mandatory standard of identity was the occasion to resolve by regulation what is in reality a competitive fight among ingredient manufacturers. Admittedly, the FDA must determine whether any proposed ingredient is wholesome or toxic. Soon perhaps this troublesome question may be removed from standard making by legislation requiring some form of pretesting prior to the use of any new and possibly toxic ingredient in any food.

But it seems wholly out of place to permit one ingredient maker to object merely because recognition of another wholesome ingredient, serving a comparable or alternate function, will affect him competitively. The merits and relative values against costs of both ought to be fought out in the market place. Food standards are not designed to function as protective fences around anyone's market. As I understand it, the law would sanction the refusal to recognize this type of objection that would delay and confound the issuance of a standard which appears reasonable to those directly regulated and primarily concerned. (*American Lecithin Co.* v. *McNutt*, 155 F. 2d 784 (C. C. A. 2d, 1946); *United States Cane Sugar Refiners' Association* v. *McNutt*, 138 F. 2d 116 (C. C. A. 2d, 1943)).

A recent court decision, however, suggests that any consumer has the legal right to question the issuance of any proposed standard—and indeed to secure court review. (*Reade* v. *Ewing*, 205 F. 2d 630 (C. C. A. 2d, 1953)). That case suggests the possibility that under the Hale bill a disgruntled ingredient supplier might appear in the guise of a consumer to object, to precipitate a hearing, and thus indirectly to make a competitive football out of the proceeding.

Yet the Hale bill specifies that he who objects must state his grounds for doing so. Patently frivolous objections ought not to be permitted to forestall the timely issuance of standards on which everyone else has agreed. Moreover, there is a fair argument that the stated grounds for objecting must disclose that the objector would be adversely affected if the proposed standard were promulgated. Absent complete administrative timidity, it is difficult to discern how any single consumer could meet these requirements. And the mere fact that recognizing another fellow's ingredient will offer you more competition is hardly a proper consumer interest—even where your lawyer has astutely clothed you in a consumer's housedress or kitchen apron.

If these side issues can be avoided —and canners not bogged down in their efforts by these trade fights among ingredient suppliers—even the most penetratingly difficult standard questions might yield to solution in informal advance discussion between the FDA and the industry group concerned. More and more those interested in sound and reasonable food standards have come to appreciate the value of forthright cooperation and the preliminary exchange of data and views and recommendations at these informal conferences. On the anvil of candid discussion often the most seemingly controversial issue can be hammered out to an acceptable conclusion. The curtailment of the FDA budget, as well as common sense and overall economy, dictate that in every instance these efforts be fully explored.

Many hope that this will turn out to be the case in connection with the proposed standardization of artificially sweetened canned fruits. These products at the moment are in a somewhat unique status which is fully described in the National Canners Association pamphlet on "Dietetic Canned Foods."

It is the view of some packers that distinctively labeled artificially sweetened canned fruits are not legally subject to the existing canned fruit standards because they neither purport to be nor are represented as the food for which a standard of identity has been promulgated.

Those of you who are familiar with the various subdivisions of Section 403 of the Act may be familiar with the buttressing analogy found in the *Imitation Jam* case. There the Supreme Court held that the requirement that any food that resembles the standardized product must strictly conform to the identity standard does not apply where there is forthright label disclosure that the product is an imitation. Logic might suggest that this is also true where the labeling of the artificially sweetened food is adequate to alert all but the most obtusely inattentive purchaser. Yet logic, some of us have discovered, unfortunately does not always control in the interpretation of statutes.

Many packers have therefore individually sought and readily obtained a permit to market artificially sweetened canned fruits under the Statement of Policy covering supposedly experimental marketing. In any event, these products are now widely packed and sold, and no one can deny that there are many consumers who want them. Few can challenge, certainly not many in this hall or on this platform, at least the esthetic desirability of some of us limiting our caloric intake.

It is generally anticipated, however, that there will be administrative consideration of additional regulations under either Section 401, which relates to standards of identity, or under Section 403 (j), which covers foods for special dietary uses, or possibly under both statutory provisions. The FDA has stated that these questions will be dealt with as soon as possible. Necessarily, if controversial issues develop, their consideration may require public hearings.

Yet it is not too challenging a hope that in these—the next important group of new canned food standards to be undertaken—the problems can be resolved by preliminary conference and not litigated in prolonged hearings. Perhaps, also, the same effort

can be made fruitful when the time comes for definitive FDA action on the additional standards on which the canning industry is now at work.

In nothing that I have suggested should you read any relaxation of my firm conviction that—where real controversy exists and cannot be resolved—there is no substitute for a public hearing. Never forget that the Federal Food, Drug, and Cosmetic Act is a penal statute. Failure to comply with a regulation embodying a mandatory standard of identity, quality, or fill of container is a criminal offense, punishable by fine or imprisonment or both. Repeated violation subjects the offender to possible imprisonment up to three years, to fines up to $10,000, or both. Goods that fail to comply with these standards are subject to seizure. Injunctions may be issued to prevent violation and the failure to obey such injunctions is punishable as a contempt of court. In short, in the formulation of food and drug standards for any industry, the FDA is writing the law of the land.

It is for this reason, among others, that Congress provided all of the procedural safeguards. The most important is that there be a public hearing. Even under the Hale bill this touchstone of the democratic process is preserved on controversial issues. The public hearing, many believe, is not only a means of focusing and preserving the controversial issue for judicial review. Requiring those who would regulate on controversial questions to appear publicly and to set forth—subject to cross-examination—the facts on which the proposed regulation must rest is perhaps the best guarantee against occasional or inadvertent arbitrary action. In turn, only exposure to cross-examination guarantees that the asserted facts are valid and do not rest upon conjecture, predilection, or unfounded opinion. This is simply another way of saying that the evidence must be substantial.

Yet the great promise of the Hale bill is that there will be less of what Dr. Cameron calls public lawyering—that the skill and acerbity of counsel and the rapier of cross-examination will less often be exercised on food technologists. Instead, it will be limited to those few instances where irreconcilable differences develop as to what is really in the interest of consumers and what is unreasonable in a proposed regulation. For the conference table to replace the trial bar there will, I repeat, have to be considerable give and take at that table.

In the fulfillment of that promise, I suspect, will lie the future of mandatory food standards. The FDA budget for this work cannot be permitted to shrink beyond the horizon of any effective effort. Nor will any Congress, properly advised and cognizant of the need, permit it to do so.

Whether the food industry and the FDA together can successfully travel this new path no one can prophesy with assurance. What I suggested in 1947 may still be valid:

> "Government officials are not here dealing with malefactors whose practices endanger the public health. They are not policing or prosecuting, but carrying out delegated legislative functions. In doing so they are dealing with economic issues of great difficulty and of vital impact on those they affect. On its part, industry must understand that it is not being prosecuted by a regulatory agency but instead is being afforded a splendid opportunity to participate in the program which Congress has ordained."

IMPROVING RAW PRODUCT QUALITY

Drosophila Problem in the Canning of Tomatoes in Maryland, 1953

By W. E. Bickley and L. P. Ditman, Maryland Agricultural Experiment Station

This report covers experimental work and observations on the following phases of the problem:

(1) Observations on seasonal abundance of adults and oviposition in fields and at canneries.

(2) Species of *Drosophila* and their seasonal abundance.

(3) Gnat populations in tomato cannery refuse.

(4) Effectiveness of space sprays at canneries.

(5) Effectiveness of residual sprays at canneries.

(6) Basket treatments.

(7) Tomato varietal susceptibility to oviposition.

Seasonal Abundance

The *Drosophila* population in 1953 was lower than during the previous season. Prolonged dry periods and abnormally high temperatures late in August and early in September were not favorable to gnat development. *Drosophila* were present in fields throughout the state but heavy populations did not appear at canning plants as in 1952. Efforts of canners to control the gnats at their plants appeared to play an important part in keeping populations down.

Field populations at College Park: Observations were made on oviposition in a tomato field on the Experiment Station farm near College Park. Freshly cut tomatoes were placed in the field at several locations and egg counts were made as an index of population density. Results are given in Table 1. This field was free of weeds and was regularly sprayed with fungicide and DDT emulsion (at the rate of 1½ pts. of 25 per cent emulsion per acre).

TABLE 1

Seasonal oviposition by *Drosophila* in a tomato field near College Park, 1953.

Five day period	Estimated average number of eggs per square inch of exposed flesh for 24 hour periods
July 30–Aug. 3	3
Aug. 4–Aug. 8	10
Aug. 9–Aug. 13	4
Aug. 13–Aug. 18	30
Aug. 19–Aug. 24	30
Aug. 24–Aug. 28	3
Aug. 29–Sept. 2	0
Sept. 3–Sept. 7	0
Sept. 8–Sept. 12	2
Sept. 13–Sept. 17	8
Sept. 18–Sept. 22	100

Field observations on Eastern Shore: Observations were made in fields in Caroline County beginning the last week of August and continuing into September. At the time of the first observation, August 27, swarms of gnats were present and oviposition extensive. Field populations increased rapidly, and on September 2 oviposition was so extensive on exposed flesh of test fruit that egg counts were impractical. Larvae were abundant in the field. Daily temperatures in the field during this period at times exceeded 100°F.

Eggs on Raw Stock: First eggs on tomatoes arriving at canneries were observed August 4. The number of eggs present increased as the season advanced, and by the last week in August local tomatoes arriving at plants were heavily infested. Observations on tomatoes arriving from different points revealed more eggs on local tomatoes than on those arriving from out of state, i.e. Pennsylvania and New Jersey. This was in contrast to 1952 conditions. These observations on presence of eggs indicated primarily that oviposition was taking place in the field and not at the canning plants.

Gnat populations at Canneries: Observations were made on gnat populations at canneries during August and September. Though swarms of

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gnats were not found as in previous years, differences in the numbers present were noted. At plants where good sanitary practices and insecticidal treatments were being carried out significantly fewer gnats were seen. At one plant known to be receiving all its tomatoes locally from heavily infested fields, gnat populations at the plant were effectively kept at a low level by liberal use of pyrethrum sprays.

Species of *Drosophila*

While *Drosophila melanogaster* is generally considered the most important species concerned in this problem, other species are involved. At College Park in September trapped samples contained 96 percent *D. melanogaster*, 1 percent *D. transversa*, and 3 percent *D. affinis*. Samples of population from canning plants on the Eastern Shore were taken but identifications have not yet been made. There are perhaps over 100 species of this family, Drosophilidae, a number of which may occur on tomatoes. It requires about 30 minutes per specimen to determine its correct identity.

In addition to *Drosophila*, house flies (Muscidae) and blow flies (Callophoridae) have been reared from rotten tomatoes in the field. Tomatoes in such condition, however, never reach the cannery. Gnats of the fly famliy Oscinidae have been observed in considerable number apparently ovipositing on sound raw stock in the field. Their eggs are small and white and could be confused with those of Drosophila. Other gnats of the family Sepsidae have also been observed hovering about tomatoes but their oviposition has not been observed.

Gnat Populations in Refuse

During 1953 visits to a number of plants were made with H. C. Mason of the Bureau of Entomology and Plant Quarantine for the express purpose of observing the disposal of wastes.

Methods of refuse disposal vary; in some cases tomato skins and accompanying wastes pass into the sewerage system of a town or city; in some cases the material is hauled to farms considerable distances from factories. A common method, probably the most common, consists of piping wastes to a "skin pile." This skin pile may be on the surface with or without earthen dikes, or pits may be scooped out of the ground to accommodate the material. At one or two plants "lagoons" are lined with concrete.

In observing skin piles no evidence was obtained to indicate that they are an important source of *Drosophila*. The daily addition of fresh material changes the nature of the medium, and the mass of waste is usually very moist except at the edges. *Drosophila* adults were not found at skin piles, and it would appear that little oviposition occurs therein. Larvae can rarely be found. The assumption is that so much water flows into these refuse dumps that conditions are not right for *Drosophila* development. However, houseflies, stable flies, their relatives, and many other scavengers thrive under these conditions.

Consistent applications of insecticides to skin piles will reduce housefly populations. Chlordane sprays applied once a week did not seem to effect good control. Housefly populations were kept at a low level when skin piles are sprayed daily with malathion 50 percent EM at a dilution of 3 quarts to 50 gallons of water. The surface of the pile is sprayed lightly and more spray is applied around the edges.

Baits of sugar or molasses with malathion or TEPP killed large numbers of houseflies about skin piles, but the overall reduction of population was not apparent since skin piles are in the same range of attractiveness as baits. *Drosophila* adults were not attracted to the baits.

In summary, observations on refuse disposal revealed that the usual factory wastes are not conducive to *Drosophila* breeding largely because of the large amount of water present and because females can find more attractive places to oviposit. Piles of rejected tomatoes, however, do provide suitable conditions for *Drosophila* breeding. Houseflies, stable flies and their allies are a serious problem in skin piles and may be controlled with daily or thrice-weekly applications of weak malathion sprays.

Space Sprays

In order to keep down gnat populations at canneries, particularly to prevent the introduction on the premises of large numbers of gnats from trucks, the liberal use of pyrethrum sprays has been generally recommended and adopted.

In 1952 small-scale tests indicated that higher concentrations of pyrethrum sprays than those usually recommended were required for effective kills of *Drosophila* adults. Several proprietary products are available, and it is difficult to make general recommendations because of varying amounts of pyrethrins and synergists and because of differences in synergists.

It is extremely difficult to ascertain the kill obtained with space sprays. Canners often refer to the "drowning of gnats" with emulsions since they see very few gnats obviously killed by sprays. Because of the way canneries are built it is hard to tell whether gnats are being driven off to return later or whether they are actually being killed. Inside buildings a better indication of the effectiveness of a space spray is given by observing dead houseflies than by counting dead *Drosophila*.

In 1953 additional experiments were conducted to evaluate pyrethrum sprays. The use of trash cans to confine gnats on baskets of tomatoes provided a means for counting flies killed. Baskets of tomatoes swarming with gnats were also sprayed at factory yards and under conditions like those at factory yards.

These tests confirmed conclusions made in 1952. Two commercial products, Sulfoxide Pyrexel 1-10, and Pyrenone T-143, performed satisfactorily when diluted at the rate of 1 part of emulsifiable concentrate to 75 parts of water. More dilute mixtures did not give satisfactory results. The variation in synergist (butoxide or sulfoxide) caused no apparent difference in kill. Plain water sprays did not kill appreciable numbers of gnats by drowning even when large amounts of water were used. The pyrethrum mixtures at 1-75 must be used liberally. Such sprays drove off more gnats than plain water, but many gnats returned as soon as spraying stopped. There was no repellency detectable.

A great many canners on the Eastern Shore used small, portable, electric atomizing sprayers (mist blowers or foggers). Two machines were used, the Challenger and the Microsol machine. Careful observations of these machines in operation at canneries indicated that when used properly and frequently they did a good job in reducing gnat populations. When trucks or baskets of tomatoes awaiting processing were treated large numbers of gnats were killed. It seemed easier to detect results with these sprayers than when a small hydraulic sprayer was used.

Many pyrethrum formulations were sold for use in these machines. A water miscible combination is preferable to a straight oil mixture for two reasons: first, because the emulsion concentrate is actually cheaper to apply after dilution; and second, because there is no off-flavor from water concentrates. These small electric atomizers have earned a place for themselves, and they are especially useful to the smaller canners. Their value in reducing adult populations depends on consistent and timely use. At a fair-sized plant one should be used frequently during each working day when gnats are abundant. Tomatoes awaiting processing and used baskets should be treated. The interior of the factory should be treated at the end of each day. Many houseflies as well as *Drosophila* are killed. These machines are superior to hand operated hydraulic sprayers for use on raw stock.

Electric atomizing sprayers also seem to be more satisfactory than aerosol bombs. In spite of the disadvantage of the electric cord, they are easier to use. Under average conditions they are cheaper to operate. Inexperienced men have difficulty in judging the time required for efficient use of aerosol bombs, and toxicants are often wasted. They are not effi-

cient except when used in enclosed spaces. The fan in the Microsol machine-type-sprayer gives better distribution of particles. If vans are used in shipment of raw stock, aerosol bombs have a place in reducing gnat populations when used at the time of loading and in transit.

The continued use of pyrethrum sprays or aerosols at canneries is advisable because it is the only known practical method of killing adults. Certainly the raw stock should be treated as it enters a plant because some oviposition will be prevented. However, applications of insecticides at this time are too late to provide the needed protection. Eggs have already been laid on tomatoes in the field and enroute to the factory. A swarm of gnats hovering over washers or at other places in and around the plant is no index of the number of eggs on the raw stock or the number of eggs which may be recovered from the canned product. Space sprays are advisable to control houseflies. They are part of a program to provide good sanitation.

Residual Sprays

In 1952 malathion residuals were shown to kill *Drosophila* adults quickly at rather low concentrations. To obtain further information on the value of malathion as a residual insecticide against *Drosophila*, sprays were applied at four canning plants. Walls, ceilings, and supports were treated with malathion 50 percent EM diluted at the rate of ½ pint in 2 gallons of water. About 600 square feet were treated with 1 gallon of spray using a nozzle giving a fan-shaped spray. The surfaces were wetted so as to give a very slight run-off. The type of treated surface, whether painted or white-washed, wood or galvanized metal affected results.

The problem of ascertaining the effectiveness of these residuals was not satisfactorily solved. Paper cups were tacked to treated and untreated surfaces at various heights with the idea that gnats killed by the residue would drop into them. Variations in abundance of gnats at different places and times precluded accurate estimates. Also gnats affected by pyrethrum sprays might conceivably land and die in the cups. Previous work with a "tanglefoot" type material had given unsatisfactory results.

After surfaces were treated at the four locations, counts of dead flies in cups were made at five-day intervals. The maximum number of gnats trapped in a five-day period was 34 in 8 cups or roughly one gnat per cup per day. Some gnats were found in cups after 23 days; this is beyond the expected duration of effectiveness after ten days. Houseflies as well as *Drosophila* were killed by the malathion residuals. Results of these experiments are not sufficiently conclusive to warrant definite recommendations in regard to the use of malathion residuals, but such deposits do kill gnats.

Basket Treatment

In 1952 tests indicated that treating baskets with malathion showed promise as a means of reducing *Drosophila* populations, and investigations were continued in 1953.

A pilot-type experiment was started at Berlin on August 11. Two quarts of malathion 50 percent EM were mixed with 40 gallons of water in a 55 gallon drum. (This is at the rate of 1 pint to 10 gals.; not 1 part to 10 parts.) Baskets were dipped five at a time, separated, marked with crayon, inverted, and stacked in pyramids in the sun to dry. Over 200 baskets can be dipped, marked and pyramided in one hour by one man. On clear days they dry in less than an hour. About ten gallons of insecticide mixture is required for treating 250 baskets. More material must be constantly added to the drum to maintain the level of liquid so that baskets can be completely submerged.

Baskets dipped at Berlin on August 11 were left in pyramids overnight. The following morning many dead gnats as well as houseflies and other insects were observed. On the bottoms of some inverted baskets on the bottom level as many as 150 dead gnats were counted. The pyramid was about 100 feet away from the nearest tomatoes. Torrential rains prevented the completion of this experiment. Before the treated baskets could be filled with tomatoes they were found floating in a field.

At Goldsboro on August 25, more baskets were dipped as described above. On August 26, 100 treated baskets were filled with tomatoes in a field, left overnight, and brought to the yard the morning of August 27. They were left on a trailer about 200 feet from other tomatoes. Very few gnats were seen around the check baskets, but when they were unloaded from the truck for processing about 4:30 p.m., many gnats were seen. As many as 300 were counted on the sides of some baskets, in the middle of the stacks. Few gnats were present among the treated baskets when unloaded.

Difficulty is experienced in evaluating the effectiveness of an insecticide under field conditions. However, it is believed that the use of treated baskets will prevent the transfer of *Drosophila* adults from fields to canneries.

As yet basket treatments are not practical. The cost of treatments which will last for about ten days would be in the neighborhood of 1½ cents per basket for malathion and labor.

If all baskets entering a factory yard were treated with a malathion residual prior to being filled with tomatoes, and if sanitary conditions at the plant were first class, densities of *Drosophila* should be kept at a low level. Malathion kills very quickly. Egg laying between field and plant should be greatly reduced. A canner, all of whose tomatoes are grown under contract or one who has control over tomatoes before picking, could utilize 100 percent treated baskets. When canners depend on the open market for their raw stock, they cannot regulate the movement of baskets, so that treatment could not be effected.

The consistent use of treated baskets has several good features. Not only would it prevent a build-up in gnat densities at the paint, but also it would result in the elimination of many adults when tomatoes are being picked and while tomatoes are in transit.

Drosophila are attracted to dirty baskets. They fly up when baskets are dumped and settle onto empty, dirty baskets. Malathion treatments should be effective at this point in reducing populations.

Varietal Susceptibility

Observations on the extent of dry cracking and oviposition were made on four varieties of tomatoes from the Plant Research farm near College Park. Samples were picked weekly during the ripening season. Fruit with dry growth cracks of one-half inch or more were recorded and the number of infested fruit determined. A summary of results is given in Table 2. It was apparent in these observations that eggs in dry cracks do not hatch and may accumulate over a considerable period of time.

TABLE 2

Observations on extent of dry cracking and gnat oviposition on four varieties of tomatoes.

Variety	Percent Dry Crack Fruit	Percent Fruit with fly eggs
Chesapeake	31	12
Maryland—16	47	16
Rutgers	65	23
Master Marglobe	72	20

Summary of Report and Recommendations for 1954

(1) In 1953 *Drosophila* populations at tomato canneries on the Eastern Shore of Maryland were not so high as in 1952, but populations in fields were higher than in other areas from which tomatoes are sent to canneries. Additional data have been obtained to show that even when few adults are at factories eggs may be abundant on raw stock. Egg counts on tomatoes awaiting processing reflect conditions in fields and not necessarily conditions at canneries.

(2) Skin piles do not appear to be an important source of *Drosophila*, but they should be sprayed with an in-

secticide to keep down houseflies. Applications to skin piles of malathion 50 percent EM diluted at the rate of 3 quarts to 50 gallons gave good results. If daily treatments are made, lower concentrations can be used.

(3) Electric atomizing sprayers were used in applying pyrethrum aerosols or mists. These machines have value in reducing adult populations when used frequently on raw stock.

(4) Malathion residual sprays on walls and ceilings of unloading platforms will kill many *Drosophila*.

(5) Baskets treated with malathion are beneficial in killing adults and in preventing oviposition at crucial times after tomatoes are picked. Their use is not generally practical under Maryland conditions.

(6) Previous recommendations in regard to sanitation should be followed, and pyrethrum sprays of some kind used. Some available materials should be used at stronger concentrations than usually recommended. It is suggested that dirty baskets be sprayed with malathion soon after they are emptied.

Tomato Grade Relationship Studies: New York, Ohio, Indiana

By Norman C. Healy,
U. S. Department of Agriculture

Tomato grade relationship studies were conducted by the agricultural experiment stations in Ohio, New York and Indiana in cooperation with the Fruit and Vegetable Branch of the Agricultural Marketing Service from 1949 through 1952. These research studies were undertaken to answer questions proposed by canners and growers of cannery tomatoes, concerning the lack of relationship between the grades of raw tomatoes, and the grades and yield of canned tomatoes and tomato products. It was felt by some in the industry that the color requirements for U. S. No. 1 grade tomatoes were too high and consequently should be lowered. It was agreed, after one of the meetings between canner and grower representatives, at which state and federal marketing officials were in attendance, that research studies would be undertaken by state and federal agencies to develop factual data which could be used by the canners, growers, and inspection officials in answer to their grade problems. Then, if it was found that grade changes were necessary, such changes would be predicated upon this research.

Thus, early in 1949, agricultural experiment station representatives from Ohio, New York, and Utah met to outline a cooperative research project with these primary objectives:

(1) To determine the grades and quantity of canned tomatoes and tomato products which could be processed from given quantities and grades of the raw product;

(2) To study the most advantageous use which might be made of various grades of the raw product, and

(3) To ascertain possible improvements in the U. S. standards for both the raw and processed products.

The Purdue Agricultural Experiment Station joined in this research project in June of 1949.

Outlines for procedure of the work were drawn up by these groups and it was decided that the Ohio station would conduct studies on canned tomatoes, tomato juice and tomato pulp.

The Purdue station would study the relationships for canned tomatoes.

The New York station at Geneva would concentrate their efforts on the grade relationships of raw cannery tomatoes to canned tomato juice.

It later developed that the Utah station was unable to take part in this cooperative venture.

The three stations studies were supported on a matching-fund basis, with half of the money coming from the states participating and half from federal funds. The federal funds were made available by the experiment stations' Marketing Research Advisory Committee from research funds authorized by the Agricultural Marketing Act of 1946.

Pilot operations were set up at the three experiment stations and experimental lots of various grades of tomatoes ranging from as small as 100 pounds to as much as 1,000 pounds were processed throughout the tomato packing season in each state. Processing studies, as well as grade studies, were conducted throughout the season. During the four-year study, additional data were obtained by station personnel at commercial tomato canneries in their respective states. This was done to check the pilot operations against commercial processing operations.

I shall confine my discussion of the results reported by the stations to general conclusions drawn from the studies, for the details can be obtained from the station reports already issued.

The Ohio station has released two publications entitled "A Study of the Relationship of Various Grades of Fresh and Canned Vegetables—Part I, Canned Tomatoes," and "Part III, Canned Tomato Pulp." A third report, on canned tomato juice, will be released soon. Copies of these reports may be obtained through Dr. W. A. Gould of Ohio State University.

The New York station has issued Bulletin No. 759 entitled "The Yield and Quality of Juice Obtained from New York State Tomatoes Graded According to United States Department of Agriculture Standards." This bulletin may be obtained through J. D. Luckett, Editor, at the New York State Agricultural Experiment Station at Geneva.

The Indiana report on canned tomatoes will be issued shortly by the Purdue station. It will be available through F. C. Gaylord at the Purdue Agricultural Experiment Station.

The results of these tomato grade relationship studies have served two purposes (1) to answer the questions which growers and processors have been asking concerning the relationship between the raw and processed grades, and (2) to use as a guide for improving the present grades and grading methods. To be more specific, the New York station workers concluded from their research that the color line between U. S. No. 1 grade tomatoes and No. 2 grade should not be changed because it was found, on an average, it required minimum No. 1 tomatoes for color to pack fancy canned tomato juice. It was also found in New York that Grade A tomato juice could not always be packed from tomatoes meeting the color requirements for U. S. No. 1 tomatoes. These studies in Ohio, New York, and Indiana showed that even though two loads of tomatoes may be of the same grade, the color index, measured with an instrument, for these two loads were not the same. That is to say, one load would yield Grade A juice and the other load Grade C juice. This is due to the wide range of color which may exist in U. S. No. 1 and No. 2 grade tomatoes.

It was found necessary, therefore, for the purpose of these studies to use an electronic instrument to define tomato color more accurately. This enabled us to assign a specific color index to each lot of tomatoes. A Hunter color and color-difference meter was employed for making these objective color measurements. The use of this instrument in our grade relationship studies, coupled with research in New Jersey, conducted by Younkin and Maclinn, emphasized the need for a colorimeter to evaluate tomato color. This led to further investigation of objective methods for grading tomatoes which I shall touch on a little later.

It was also concluded, from the studies in New York and Ohio, that the present U. S. No. 2 grade tomatoes should be further segregated into two separate classifications: No. 2's for color, those not meeting the No. 1 requirements for color; and No. 2's for defects. It is apparent from these studies that the No. 2's for defects

require more man-hours for trimming, reduce the yield of the canned product, and increase the risk of high mold. This segregation of No. 2 tomatoes can be handled under the present two grades for cannery tomatoes now in use; that is, the U. S. Standards for Canning Tomatoes and the U. S. Standards for Tomatoes for Manufacture of Strained Tomato Products. It would simply require that the tomato inspectors segregate the No. 2's for color from the No. 2's for defects, and report the percentage of each on the inspection memorandum, providing the canners are willing to pay the additional cost in making this segration.

In the course of these tomato grade relationship studies, Dr. Gould and his associates at the Ohio station designed and tested various light boxes by using daylight lamps to furnish a constant light source for grading tomato juice. As a result of this work and studies conducted by the Processed Products Standardization and Inspection Branch, a light box called the Macbeth Munsell Disk Colorimeter was developed in cooperation with the Macbeth Corporation. This portable light box eliminates variation in light intensity, providing a constant light source very similar to daylight. This increases the accuracy of color grading by visual means. The Processed Products Standardization and Inspection Branch has furnished six of their field grading laboratories with these lights for trial in grading tomato products. If proven useful in commercial inspection work, the light will benefit not only the inspection service but the industry as well in increased efficiency and more accurate grading procedures.

Time will not permit me to discuss all the results reported in the station publications. However, these cooperative studies emphasized the importance of the development of objective quality tests. The Fruit and Vegetable Branch two years ago initiated research on the problem of developing an objective method for grading cannery tomatoes.

During the 1952 season, two Department technologists spent a week in each of six tomato canning states testing three colorimeters for objectively measuring tomato color: The Hunter color and color-difference meter, which is best adapted for reading tomato pulp or juice color but can be used to measure different spots on the surface of a tomato; the Purdue color ratio meter, developed at the Purdue station, to evaluate either the surface color of a tomato or the color of the juice or pulp; and the Model "E" Agtron, which measures the color of two cut halves of the tomato. The purposes of this work were:

(1) To test the ability of these instruments to define color lines between U. S. No. 1, No. 2, and cull tomatoes;

(2) To determine the effect of area, variety, and growing conditions on these color lines; and,

(3) To determine the relationship between internal and external tomato color.

Very briefly, the procedure was to have the inspector select minimum color No. 1 and No. 2 tomatoes on the basis of surface color. The whole tomatoes were then presented to the Purdue color ratio meter for a color reading. The tomatoes were halved and those still considered as meeting the minimum color requirements for No. 1's and No. 2's were read on the Agtron. The pulp was then extracted on an Enterprise meat and food chopper fitted with a juicer-puree attachment having a 0.027-inch mesh screen. The color of a sample of the pulp was then read on the Hunter color and color-difference meter and the Purdue color ratio meter. Another sample of the pulp was deaerated and measured on these two instruments to determine whether sufficient air had been incorporated in the pulp during extraction to affect its color. Results indicated that deaeration is not necessary for objective color evaluation when this type of extractor was used.

This study indicated that these instruments would require further modification before they could be used for grading borderline tomatoes on the basis of color.

In attempting to correlate the color of the cut halves, as viewed by the inspector, and the value assigned by the Agtron, poor agreement was obtained between the inspector and the instrument due to the varying amount of yellow seeds and "white rag" exposed on the cut surface. The instrument reads the exposed cut surface while the inspector disregards the color of the seeds and rag and evaluates only the color of the cell walls, since seeds and rag are expelled at the finisher in processing juice and other tomato products.

Here, again, it was found that although the Hunter color and color-difference meter was the most accurate in defining color lines for the various grades of tomatoes, a much simpler instrument was needed for commercial application.

This past season, the two technologists, Wilson and Dever, again used the Hunter instrument as a standard to evaluate the performance of the eye to determine tomato color. A new instrument—the Model "F" Agtron, which measures the color of pulp—also was tested.

Very briefly, the procedure followed this past year was to determine whether a representative subsample of about 10 pounds could be obtained from the three or four baskets of tomatoes sampled from a load. This sample was then pulped and the color measured on the two instruments, the Hunter and Model "F" Agtron. This was then used as the color index for the load. The remainder of the three-basket sample was graded in the normal manner for defects. The results of the work this past season suggest the possibility of using a combination of the color index of a sample and the percentage of defective tomatoes to determine the value of a load of tomatoes. A report of this past season's research has been written by Dr. Wilson of the Fruit and Vegetable Branch and will be issued sometime before next tomato season.

At present, we have not solved enough of the problems to warrant use of this method on a commercial basis this next season. There is still more work to be done on the sampling procedure, testing the simplified instruments, and relating the new system to the one now in use.

When the method has been simplified so that it can be used on the platform without causing undue dalay or the use of complicated techniques, then it can be tested at various grading stations to familiarize canners and growers with the procedure. For, in the final analysis, it will depend upon them whether such a method is adopted commercially. We rocognize the fact that any such method may require further modification before it meets the requirements of both canners and growers.

Another consideration which should not be overlooked at this time is whether the grower will agree to have determination of the color of a load of his tomatoes based on a pulped sample of tomatoes. This can be answered only by the grower when he has become familiar with the grading procedure and its effect upon his picking operations.

It is of utmost importance to the grading services to incorporate objective measures of quality into their standards to minimize the human variation which occurs in present methods of grading and inspection. I don't mean by this that all the problems of grading and grade interpretations can be solved by instrumentation. However, there remains much to be done in providing inspectors with other inspection aids to enable them to do a better job in the future.

The cooperation of the state experiment stations, state bureaus of markets, plus growers and canners' research committees, with the Department of Agriculture in working together on these grade problems has enabled us to conduct the work on a much broader scale than could have been done by any single group. I firmly believe that this type of research, conducted on a cooperative basis, will be most productive and can be used to great advantage by both industry and government.

FLUCTUATING FISHERY STOCKS

Fluctuating Fishery Stocks: What We Know about This World-wide Riddle

By L. A. Walford, Chief,
Branch of Fishery Biology,
Fish and Wildlife Service

Many of you are concerned about the condition of your fishery stocks, several of which seem to have receded to a low ebb of abundance in recent years. You are asking what has happened to pink salmon, to Alaska herring, to Maine sardines, to the Pacific sardine, to the Gulf of Mexico shrimp. Are there fewer of them in the sea? Or have they perhaps retreated to distant, more obscure areas and become less accessible to fishermen? Whatever the nature of the condition may be, is it permanent? It is not only Americans who are concerned with these questions. So are people in other parts of the earth, for comparable conditions have occurred elsewhere, not only in California, Maine and Alaska, but also in such distant and widely separated places as Japan, India, Spain, North Africa. Is this all the result of mere coincidence? Could any important part of this effect have sprung from some common cause impelled by such a cosmic influence as weather, for example, which might affect these diverse species in a similar way? Are all these recent and current seemingly peculiar conditions within the range of normal variation? That last question is most important, because the seriousness of present conditions can be judged only in comparison with some standard; and that standard, which we call the normal cannot be simply defined.

In the language of our everyday conversation, the word "normal" tends to have the rather fuzzy meaning of things-as-they-should-be. Lucky is the "perfectly normal man." There is nothing wrong with him. It will be a fine thing when "the country gets back to normal again," when our domestic and international problems have become resolved. When enough food is produced to feed the millions of hungry people of the world, they can enjoy "normal lives." Those are conceptions we hear on every side. In its popular connotation, normal is the good state of affairs, the good life. In the language of the statistician, it is something quite different—not nearly so cheerful a word, but very much more exact. It is simply the average, the sum of all the items divided by the number of items—the lean years and the fat, the good and the bad, the tall and the short—whatever it may be that we are talking about.

L. A. WALFORD

Part I—The Problem; Some Contributing Factors

We are talking about fishes and invertebrate animals that happen to be commercially useful for canning. Exact information about the history of these species is limited to relatively few recent years when they have lived under the pressures of intense fisheries. We know nothing about their fortunes under virgin conditions. In those days, did they go through alternating periods of great abundance interspersed with periods of contrasting scarcity? What was their normal life then? We cannot tell. A great part of what we can learn now we must deduce from the catches of fishermen. Thus, in searching for normal patterns about the complex lives of fishes in order to understand the significance of events in a single year like the last, we must take into account patterns in the complex affairs of men. The behavior of fishermen fluctuates in response to economic conditions; and for that reason as well as others the intensity of fishing rarely remains constant long. Fishing techniques improve, fishing fleets increase in size, and markets change. And because recorded history about these aspects of fisheries is usually exasperatingly fragmentary, it is difficult to draw absolutely certain conclusions about normal conditions of fish or of fisheries. This much, however, seems clear: conditions have rarely been "normal," as I will show you in these few graphs:

Figure I. Fishery harvests are characteristically unstable, subject to irregular oscillations. This is illustrated in schematic representations of 150 years of Atlantic mackerel fishing, 50 years of American cod fishing, and 37 years of Pacific sardine fishing.

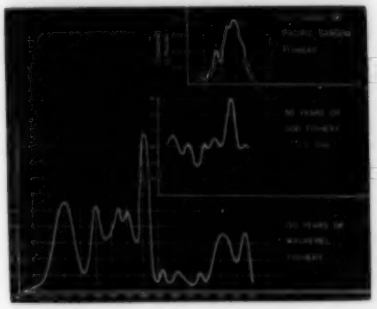
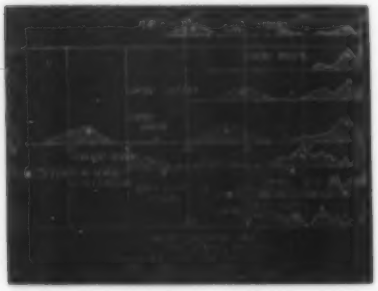


Figure II. A graphic record of 20 years of sardine fishing in northern Spain.

Figure III. In 300 years of Japanese fishing for tunny, skipjack, herring, squid, and saury, periods of abundance alternate with periods of scarcity. Data are not statistically good enough to demonstrate any periodicity in these waves; nevertheless some Japanese scientists interpret that waves of maximal abundance have occurred about as follows: tunny 60 years apart, skipjack 80 years apart, sardine 100 years apart, and Hokkaido herring 50 years apart.

Part of the fluctuations shown in these records reflects economic condi-



tions, part reflects the degree of accessibility of the fish on fishing grounds, and part—surely a very important part—reflects fluctuating abundance of the fish. Fishery biologists work continually to resolve these influences and have made much progress in that effort. They have long been in general agreement that fluctuations in environmental conditions cause fluctuations in abundance of the fish; but what elements of the environment are critical and by what mechanisms they affect the survival of fish, are problems that remain largely unsolved. As long as that is true, fishing must continue to be the uncertain occupation that it is.

Agricultural science is far ahead of fishery science in understanding the biology of the environment and making use of that understanding. But then, of course, the problems of agriculture, difficult though they may be, are very much simpler than those of fisheries. For the farmer has the enormous advantage over the fishery man of being able to perceive his produce as it develops; and there are various things he can do to protect it when a period of unfavorable weather hits, such as a cold spell or drought. Because the farmer can follow the vicissitudes of his produce with his eyes, he is constantly aware of what is happening on his land. He knows the limits of his piece of the environment and he can put a fence around it which will contain his crops and his animals; and therein they will stay until he is ready to harvest them.

The fishery man enjoys none of these advantages. The environment in which he is most interested, the body of water in which dwell the fishery stocks that give him his living, is continually moving, changing direction, position, levels. Now it is close to the shore, now far at sea, now at the surface, now deep in the depths. It expands and contracts, like a living thing; and as far as we can tell, the fishery stocks which it contains tend always to fill it to its capacity and to remain in it wherever it goes. But its capacity evidently also changes constantly. All the evidence which has accumulated about the natural history of aquatic animals indicates that their environments have limits beyond which they cannot stray very far. How can we define those limits? How can we distinguish a body of water which contains all the materials that attract mackerel from a body of water which repels them?

One of the most obvious boundaries of the territory in which an aquatic animal can live is temperature. Fish are exceedingly sensitive to temperature. I will give you one example to illustrate this point.

Dr. H. O. Bull, a marine biologist working at the Dove Marine Laboratory, Cullercoats, England, became interested in learning just how sensitive a fish is to various qualities of the environment. What does a fish feel? That was the sort of question he asked, a very difficult question because fish feel and respond to many different stimuli. So it was necessary to build special aquaria designed to permit him to exclude all stimuli except the one being studied. So he carried on a number of experiments to test the sensitivity of cod fish to temperature. First he conditioned the fish to associate the presence of food with a change of temperature. Then, having done that, he determined what degree of change the fish would respond to by observing the minimal temperature at which it would perform a complex task in order to get food. He kept the fish in a specially constructed tank with the floor inclined so that one end was deep enough to provide a habitable living space and the other end extended out of the water. He introduced the food into a chamber at the upper end of the inclined floor. Gradually, over the many days that the conditioning process went on, the fish learned that food was in the chamber when the temperature of the water increased. As this association became more and more firmly established, the subject fish became conditioned to move up the inclined plane. At the same time, the food chamber was gradually moved upward, day by day, ever farther out of the water. At last the fish learned to go quite out of the water, wriggle into the food chamber, and there wait practically high and dry until food was given, which it then seized sharply, and swam and splashed back to its normal position in the deep part of the tank. There was no mistaking the response. If the fish detected a change of temperature, it went through this remarkable performance; otherwise it did not.

With such experiments, Bull demonstrated that under some circumstances, sea fishes react purposefully to changes in temperature of only 0.03° C., and in salinity of 0.2 parts per thousand. These results indicate the extreme care with which field oceanographic studies must be designed, and the precision with which observations must be made at sea—the figures are close to the limits of accuracy of hydrographic instruments—in order to determine relations between oceanographic conditions and biological effects. They also suggest how some striking changes in marine climate that have been observed in recent years can affect the fish directly. The distribution of marine animals is sharply limited by temperature barriers, as I will illustrate with a few charts:

Figure IV. A chart showing the distribution of sardines of the world. Sardines are somewhat less closely bound to land masses than are other members of the same family with which we are familiar, namely herring, menhaden and shad. Shad must ascend rivers to spawn; menhaden spawn about estuaries; herring in the intertidal areas; sardines may spawn as far as 200 to 300 miles at sea. Their young come close in, the first months of life along shore. The temperature range of sardines (about 12° to 20° C.) is intermediate between that of the menhaden and that of the herring.

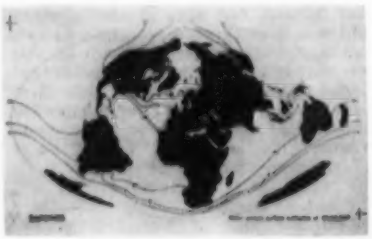


Figure V. A chart showing the distribution of menhaden and similar fishes. In general, these require warmer water than pilchard can tolerate and they occur only in regions with extensive estuarine areas. They spawn in or near estuaries, and their young move into salt water sloughs and marshes and even up into fresh water during their early growing period. Thus the growth and survival of menhaden are more affected by local conditions than many other marine fishes. Inshore conditions of the environment are less stable than are those offshore, hence these fishes are more subject to violent fluctuations.

Figure VI. A chart showing the world distribution of herring. This is a cold water fish occurring only in the northern hemisphere, north of the range of pilchard.

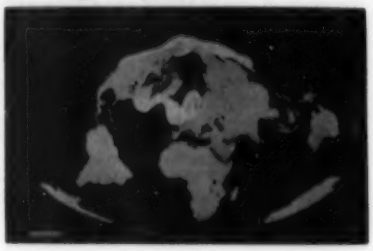
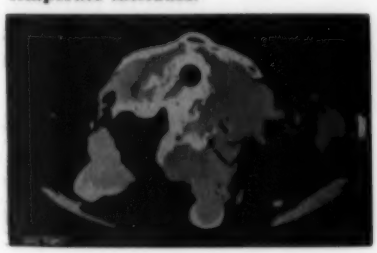


Figure VII. A chart showing the distribution of Pacific salmons. This group of fishes can exist only where there is a peculiar combination of stream conditions and of oceanic conditions, as proved by the fact that although their eggs have been transplanted to many parts of the world, Pacific salmon have taken hold only where environmental conditions approximate those of the North Pacific, i.e., New Zealand, Chile, Maine, New Brunswick. In streams, the optimal temperature conditions for the incubation period are somewhere between 4° and 11° C. Eggs suffer severe mortalities if subjected to excessive periods outside those limits. After hatching, the optimal temperature range which controls the growth and survival of the young lies between 13° and 17° C. Prolonged periods beyond these limits cause excessive mortalities among the young. In the ocean, salmon seem to be limited during their spawning and seasonal migrations to a temperature zone at the surface of about 0° to about 20° C.

Figure VIII. The cod family which furnishes about 19 percent of the world's harvest of sea fish is widely distributed on continental shelves in temperate latitudes.



I have shown you that various groups of fishes are confined to certain types of environments and in particular to certain temperature zones. Is there any evidence that there could have been important changes in the location of the boundaries of these zones in recent years that might account for changes in accessibility or abundance of the fishes? In places, yes, as the following charts will show:

Figure IX. North Atlantic weather as reflected by anomolies in temperature at New Haven. Deviation of average monthly temperature from a 150-year average shows irregular fluctuations and a trend toward warmer winters and summers beginning about 1890 or earlier. Here it has been demonstrated that air temperature and sea surface temperature are positively correlated.

Many European scientists have pointed out evidence that arctic and subarctic areas have been warming, and that there have been pronounced changes in fauna and flora.

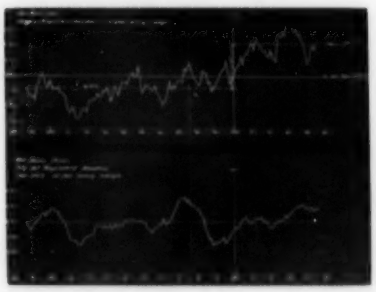


Figure X. The difference between average winter (January) and summer (July) temperatures at the surface of the sea water at Boothbay Harbor, Maine, has decreased since about 1920, indicating an increased mildness of climate. A graph shows annual deviations of these differences from average over the period 1906 to 1947.

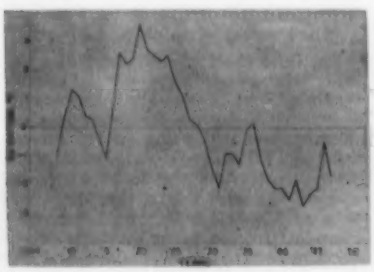


Figure XI. Annual average sea surface temperatures at Iceland have increased during this century, as shown in the following chart.

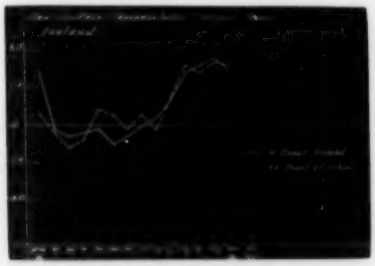


Figure XII. Thirty years weather in Rhode Island as indicated by difference between January and July average temperatures. These differences are plotted as deviations from normal. This graph is compared with the commercial catch of lobsters in Rhode Island. This comparison indicates a positive correlation between the catch of lobsters and the degree of difference between January and July temperatures. Rhode Island is near the southern end of the range of lobsters. During a series of years of relatively cold winters in Rhode Island, lobster fishing flourishes; during a series of warm winters, it languishes.

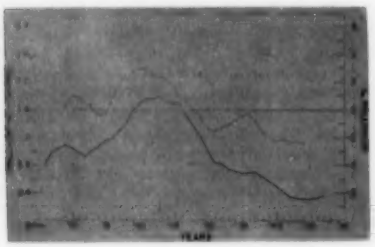


Figure XIII. The catch of lobsters in Maine, on the other hand, is positively and significantly correlated with the temperature of the surface of the sea water as measured at Boothbay Harbor.

Rhode Island is close to the southern extreme of the geographic range of lobster. The effect of the climatic change was to shift the zone of most favorable conditions toward the north.

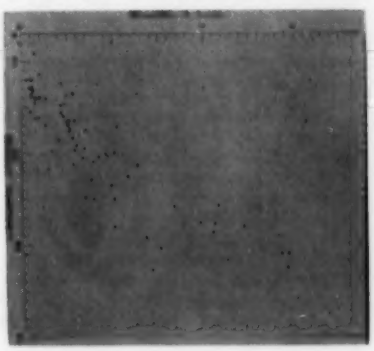
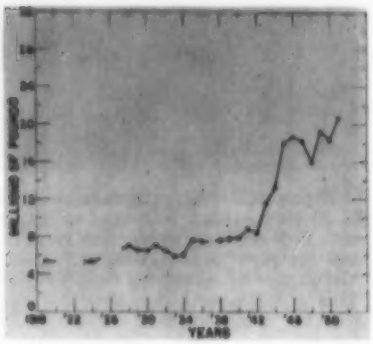


Figure XIV. Commercial catch of lobsters in Maine, 1918-51, shows an increase in catch from 8 million pounds to over 20 million pounds.



There are various ways by which climatic changes of this sort might affect these food fishes. Most directly and simply, they could change the location of the environment having the physical characteristics to which these fishes are physiologically adapted.

If a fish feels uncomfortable because it is too hot, it will move into a cooler zone. This is probably true not only of fishes but of all other classes of animals. Warming encourages invasion by predatory species from warmer zones, and these drive out the former dominating residents. This sort of action may go on all the way along the food chain.

Another effect of changing climate is to stimulate diseases to burst into epidemic proportions. There is mounting evidence that fungi and viruses, which are very sensitive to temperature changes, sometimes severely decimate populations of marine animals and plants.

Striking examples of changing distributions are given by the spread of the mussel parasite and the green crab in the North Atlantic; the northward spread of the cod into the arctic; the return of menhaden to the Gulf of Maine; the shift in composition of the species of shrimps of the Gulf of Mexico, and of shads off the coast of India.

Biologists have been rather slow to become aroused to the possible significance of these changes. Those in countries bordering the Atlantic were first to become interested, perhaps because the effects are more striking in the North Atlantic. Gradually this interest is spreading to other parts of the world, and scientists are beginning to consider the possibility that we are dealing with a world-wide phenomenon.

Fluctuating Fishery Stocks: What We Know about This World-wide Riddle

By Roger Revelle, Director, The Scripps Institution of Oceanography of the University of California

The seas are so vast, and so alien to us as land mammals, that it is difficult for us even to conceive of the ways of life in the ocean. For this reason, we are liable to explain the widespread disasters to the fisheries during the last few years in one of two ways:

We may indulge in self-recrimination and say that the fish populations have become depleted by merciless exploitation. This is the point of view of those who claim that most of the fish are now in a can. Alternatively, we may say that fish are wayward creatures whose behavior is whimsical and irrational. They appear in a certain area for no apparent reason, and they disappear. This point of view may be summarized by the statement that fish, like gold, are where you find them.

There is undoubtedly some truth in both these ideas. But it is my chief purpose today to present a third point of view: that fish, like all other living things, are to a great extent creatures of their environment; the sizes and locations of fish populations depend on the characteristics of the ocean waters in which they live. It follows that we may gain a useful understanding of the fluctuations in the fisheries by achieving a greater understanding of the oceans. This third point of view may be summarized by saying that fish are better oceanographers than people, for at the present time, unfortunately, our knowledge is so fragmentary and our understanding so limited that in many cases we cannot satisfactorily explain what has happened to large fish populations.

To establish a framework for understanding of the ocean waters, it is tempting, though it may be dangerous, to draw analogies between the familiar conditions of life on land and the strange world of the sea.

On land the cycle of plant and animal life appears to us a simple, straightforward one. First there is the grass, which by a subtle and complex chemistry captures the energy of sunlight and builds organic matter. Then there are the deer and the cows that live on the grass, and the tigers and men who eat the deer and the cows. Finally, there are the bacteria which decompose the dead bodies and the excreta of all living creatures, making the constituent substances again available as building materials for the plants. In the sea the same cycle of sunlight, plants, animals and bacteria exists, but with what a difference. Instead of grass there are tiny plants floating in the blue waters, and in place of cows the animals that eat these plants are copepods no bigger than the head of a pin. The tigers that eat the cows are arrow worms and euphausids, only a fraction of an inch in length, and a series of intermediate meat-eaters exists between them and the fish, which represent for us the ocean harvest. Since every link in this long food chain is inefficient, it is not surprising that we reap from the ocean only about 20 million tons of food a year—only a small fraction of the production of our farms on land, and less than a tenth of one percent of the organic production of the sea.

Part II—Other Contributing Factors; The Green Pastures of the Sea

On land, we are used to a great compression of the zone of life. For the most part, it is confined to a thin surface layer a few tens of feet thick. But the whole giant volume of the sea is the theater of life. Even in the great depths seven miles below the surface, where no light penetrates, the temperature is always just above freezing, and the pressure is more than 15,000 pounds per square inch, recent oceanographic expeditions have found scores of different species, and the bottom muds at these depths teem with bacteria. But the plants of the sea, on which all other living things depend, grow only in the waters near the surface where bright sunlight penetrates. These subsurface waters differ widely in fertility. Like the land, the ocean has its green pastures, where life flourishes in abundance, and its deserts where a few poor plants and animals barely survive. Unlike the rich soil of Iowa, which remains nearly constant in fertility from year to year, even the most productive ocean areas sometimes drastically decline in a relatively short time. After a period of years they may with equal abruptness apparently recover their fertility.

The fertility of the land depends primarily on four things: air temperatures throughout the year; the intensity of sunlight during the growing season; the amount of water; and the presence of a sufficient amount of plant nutrients in the soil—that is, substances such as phosphate and nitrate and many others, which usually occur

in very small amounts but are essential for plant growth. We can easily see the importance of all these factors by contrasting the luxuriant growth of a tropical sugar cane field, where the temperatures are warm throughout the year, the rainfall is abundant, and the soil is supplied with plant nutrients by fertilization, with the sparse growth in a dry desert or on the cold Arctic tundra, or on the rocky, glaciated, virtually soilless hills of New England.

In the sea, water is of course always abundant, the plants are well adapted to the relatively narrow range of temperature; and the intensity of sunlight determines the length of the growing season and the depth to which plants can grow, but apparently not the differences in fertility. These depend only on the plant nutrients present in the waters near the surface. As with any well-worked soil on land, these plant nutrients must be replenished each year. They are always being depleted by the slow sinking of plant and animal remains from the brightly lighted subsurface waters into the dark waters of the depths. Men plow the soil to restore its fertility by bringing up to the surface the plant nutrients which have been carried downward in solution. Similarly, the fertility of the sea is restored when the nutrient-rich deep waters are brought up near the surface. This "plowing of the sea" must be carried out on a very large scale and can only be accomplished by the ocean itself. The regions where the ocean plowing is most effective are the green pastures of the sea.

The ocean plowing is accomplished in one of three ways. In some regions the wind drives the surface waters away from the coast, or away from an internal boundary in the sea, and nutrient-rich water wells up from middepths. In other areas the surface waters are cooled near to freezing in the wintertime, become heavy and sink, and mix with the nutrient-rich deep waters. Elsewhere, violent turbulence occurs along the boundaries between major ocean currents, and some of the nutrient-rich deep waters are thereby brought into the brightly lighted zone where the nutrients can be used by the plants. As Sverdrup has pointed out, most of the great fisheries of the world depend for their existence on one or another of these three ways in which the ocean plows itself. The sardines, anchovies and mackerel of California, the sardines of South Africa, the tunas off the West Coast of North and South America, the bonitos, albacore and hake of Chile and Peru, the apparently abundant deep tunas in the equatorial zone of the Pacific, all live in regions of up-welling, where the deep water is pumped to the surface by the wind. The cod, herring and haddock of Newfoundland, Labrador, Iceland, Greenland, and Bear Island live in the regions of winter cooling. The sardines of Maine and the flat fishes of the Grand Banks live where the Gulf Stream and the Labrador Current clash in turbulent mixing; the sardines and herring of Japan and Kamchatka similarly depend on turbulence between the Oyashio and Kuroshio, which are the west Pacific equivalent of the Labrador Current and the Gulf Stream. All three processes are important around Antarctica, where the giant whales live in such great abundance. The guano industry of Peru, the very life-blood of that land, depends on intense up-welling on the shoreward side of the Peru Current. There the guano birds carry out what is probably the world's largest fishery, amounting to several million tons of anchovies and their relatives each year.

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Variations in the weather and in the speed and location of ocean currents, and possibly in the amount of soil and dissolved material carried to the sea by the rivers bring about wide variations in the fertility of the sea's green pastures. We have some evidence for this in the observed fluctuation of the annual crop of plant plankton in different regions. Other evidence comes from fluctuations in the numbers of young fish before they are old enough to be caught by the fishermen. Most fish of the high seas spawn so many eggs that it is difficult to believe these fluctuations in young fish numbers can be due, except in cases of extreme depletion of the spawning population, to fluctuations in the number of adults. Perhaps it is better to say that the variations in the amount of available food and in the numbers of predators and competitors are so great as to mask any relationship between the numbers of adults and the size of a new year class.

Variations in the strength of the new year class, not apparently related to the size of the parent stock, have been observed in many fisheries; for example, the Atlantic, Pacific and Japanese herring, the North Sea plaice, the Atlantic haddock and cod, and the California sardine. In most instances we are not sure whether these are brought about by actual changes in fertility, by some other process related to the ocean circulation, or by little understood biological factors. One instance in which changes in the fertility of the water would appear to be closely related to changes in the young fish population is in the English Channel, where during the years from 1924 to 1937 Russell found good correlation between the winter maximum of phosphate in the water and the numbers of summer-spawned young fish. Fluctuations in the adult population—that is, the rate of natural mortality—may also be related to variations in the food supply —that is, the fertility of the water. The unexpected decline in the catch of Alaska pink salmon in 1953 could well be an example.

Perhaps of greater importance, both to the fish and the fisheries, than the variations in fertility of a particular region, are the fluctuations in the weather and in ocean currents, and the accompanying changes in the temperature and other properties of the water. Just as the elk of the plains and the caribou of the tundra live in a well-defined climatic region and migrate north and south as climates change, so each species of fish has a limited range of tolerance to the ocean climate. Moreover, even though the fish can swim fast and well, their movements seem to be affected by the ocean currents. Consequently, the distribution of a fish population may change as the currents change. But the locations of the areas of high fertility are not much affected by the currents. Thus, both the adults and the young fish may be carried out of regions of high fertility and good food supply into a harsher environment, where many of them must starve or be weakened in vitality so that they become easy victims to predators. There are no fences around the green pastures of the sea. For example, one of the principal factors bringing about recent poor year classes of California sardines may be changes in the

ocean currents off the California coast. During the years when the young sardine population was large, a pronounced counter-current flowed northward between the shore and the southward moving California Current. The counter-current has been weak or absent during the last few years, and the center of population of both the adult and young California sardines has shifted southward far down the coast of Lower California. The fertility of this area is probably much less than that of the waters off California, and it is likely that at least some racial groups of the sardine population have greatly diminished in numbers. In the Atlantic, variations of year class strength of plaice, herring and other species have been shown by Jensen to be correlated with fluctuations in the currents between the North Sea and the Baltic.

In addition to their effect on population size, changes in water temperature and ocean currents may profoundly affect the success of a fishery in another way: by making the fish more or less available to the fishermen. From the point of view of the fishermen, we may divide these fluctuations in temperature and currents into two classes: long-term changes and short-term changes. The increase in the cod fishery of Greenland during the last 40 years is a classical example of a beneficial effect of a long-term change in ocean temperature on the fisheries. Here the average water temperature increased by nearly 2° F. during the 20 years from 1906 to 1926, and is still considerably above the average for the middle of the last century. This increase in ocean temperature has been accompanied by a great northward migration of the cod.

Off Southern and Lower California, the average air temperature, and presumably the water temperature, decreased by about 2° F. from 1850 to 1900, and has apparently since slightly increased. Several species of warm-water fishes were abundant off San Diego in the 1850's and have only rarely been seen since that time.

Major changes in ocean currents and ocean temperatures over a short term usually have a bad effect on an established fishery because they result in the movement of the fish out of the area where the fishermen can profitably catch them. In general, the more highly developed and specialized a particular fishery becomes, the more vulnerable it is to changes in fish distribution. For example, the southward move of the sardines from Southern California to Lower California waters has made them virtually unavailable to our California fishermen. Fluctuations in the temperatures of the waters off Japan and presumably in the position of the Kuroshio and Oyashio currents are closely correlated with the success of the Japanese sardine and herring fishery. Interestingly enough, when the sardine fishing is good, the herring fishing is poor, and vice versa. This suggests that when the southward flowing Oyashio Current is displaced to the south along the Japanese Coast, and consequently the water temperature cools, the sardines move south out of the normal fishing grounds but are replaced by the herring coming in from the north.

Last year the warm water of the eastward flowing equatorial counter-current turned southward along the coasts of Ecuador and Peru, bringing heavy rains and floods on shore and causing extensive changes in the ocean environment, resulting in mass killings of fish, the deaths of countless thousands of guano birds, and a very sad year for the California tuna fishery. This disastrous shift in the currents occurs, on the average, once every 30 years, and is called él Niño (the child) because it usually happens about at Christmas-time.

It is more than natural to ask whether fluctuations in ocean currents and temperatures can be predicted, for if this were possible, many millions of dollars could be saved by both the fishermen and the processors. Unfortunately, we do not know enough at the present time either about the ocean or the atmosphere to be able to predict changes from year to year.

But we can say a few things: first and most important, changes in ocean currents and temperatures do not always go in the same direction, but fluctuate around an average value. Bad luck in the fisheries, even over a period of year, does not spell a message of despair. We have every reason to believe that the situation will sooner or later reverse itself. The question of course is when? Here we are on more uncertain ground, for nearly all the evidence to date suggests that these changes are not cyclical with a regular and predictable period like the tides and seasons, but irregular. We know that change is the natural, not the exceptional, situation. But at present we can predict changes only in a statistical sense. Essentially, this means that large sudden variations are the least likely.

A more meaningful prediction for man requires that we find cause-and-effect relationships, or more accurately, that we discover a series of events that always happen in a certain sequence and are correlated in magnitude. Moreover, predictions are of value only if they can be made a considerable time in advance. This requires that the event on which we base our prediction must happen a considerable time before the event we are trying to predict. Because fish usually take several years to grow up, we have a hope of developing a useful prediction system for variations in the size of populations if what happens to the young fish is important in determining the numbers of adults. On the other hand, in order to predict where the fish will be a year or so in advance, that is, the locations of populations, it will be necessary to find some relationship between the weather and the currents, in which what happens to the weather today will affect the currents several weeks or months, or preferably years from now. We have at least a glimmering of a relationship between world-wide weather phenomena and fluctuations in the ocean currents. In the North Pacific, for example, there is usually an area of atmospheric high pressure. It is possible that when the center of this high pressure area moves eastward, the southward-flowing California current is squeezed against the coast and the counter-current disappears (at least in the surface layer), with the result that the center of sardine population shifts southward out of the range of our fishery. At the same time, the Kuroshio—the Japanese equivalent of the Gulf stream—follows the high pressure area eastward and moves off shore away from the coast of Japan, making room for the Japanese equivalent of the Labrador Current, the Oyashio, to move southward close to shore. The result is that the center of Japanese sardine population likewise moves southward out of the range of the Russian and Japanese fisheries.

It is appropriate here to say a few words about the role of the fisheries biologist and the oceanographer in helping to maintain and develop the fishing industries. At the beginning of this talk I pointed out that we can gain useful understanding of the ways of fishes through greater understanding of the oceans. Science and engineering can be of greatest value in the service of man only if they proceed logically in four steps: from a foundation of careful observation of what is taking place in nature through understanding of why things happen, to prediction of what will take place, and finally to control of nature. This is a long and slow process. Too often in fisheries science we have attempted to run before we could walk—we have established controls and attempted to predict what would happen before we have understood why things had happened, and even before we have observed what has happened. At the present time in oceanography we are still in the stage of observation.

Each of the four steps of scientific and engineering progress may have

considerable value to the fishing industries. By observation, we may help to discover new fisheries resources. The deep tunas found by the Pacific Oceanic Fisheries Investigations south of Hawaii, the king crabs of Alaska, and the shrimp off the Atlantic Coast are examples of new resources discovered by observation. If we can gain understanding of why fish populations change, we may be able to estimate the effects of man on the fisheries and thus to establish useful management measures, of value to all. Through understanding based on observation, we may be able to develop means of prediction which will help in industry planning. Finally it is by no means impossible that we shall learn eventually to control some aspects of the ocean. I am thinking here primarily of the possibility of increasing the fertility of the green pastures of the sea. Ten years ago I would have said that this was impossible or at least economically unfeasible. For example, I believed that the fertility of the California waters depended upon the phosphate and nitrate brought up to the lighted zone by up-welling. This amounts, at a minimum, to several hundred thousand tons of phosphate a year. But recent work suggests that the fertility actually depends on substances present in very much smaller concentrations than the phosphate. It may be that the total amount of these substances needed to double the fertility of the California waters each year is only one or two thousand tons, and if so, we might eventually by a relatively small expenditure, be able to add these substances to the water and thereby to increase greatly the yield of the California fisheries.

Service Research and the Fishing Industry

**By John L. Farley,
Director, Fish and
Wildlife Service**

It is a pleasure to meet with a group whose members have done so much to add to the enjoyment and ease of good living. You devote your lives to preservation of foods by canning; I represent an agency of government that devotes itself to the preservation of the productivity of the raw material which is the basis of your industry.

Thus the word "preservation" expresses an idea which each of us fosters, though from different points of view.

The preservation of foods by canning had its earliest beginnings as an art, and through industrial research has gradually evolved into an exact science. Thus you have learned how to control the quality of your product by the application of formulae which time and experience have proven to be dependable. We are striving for a similar goal. I say "striving" because the preservation—or conservation as it is more commonly called—of the productivity of fishery resources is still a science-in-the-making. One of the principal functions of the Fish and Wildlife Service is to further the development of that science through study of the living fishery stocks as they are affected by fishing. The goal of our scientific staff, of course, is to provide the information required for rational direction of fisheries, and it is the task of administrators to translate that information into practical application which usually takes the form of regulations.

As I get deeper into the job of making decisions about regulations, I find unexpected complexities, for problems relating to the affairs of men must be considered as well as those relating to stocks of fish. Consequently, issues which are not often as crystal clear as we would like them to be, demand all the careful, wise analysis that we can bring to bear on our judgments.

Here let me add my word of welcome to Arnie Suomela, our new Assistant Director, who is going to play a very important part in making those judgments. Those of you from the Pacific Northwest need no added words of mine to have you know Arnie Suomela; he has been part of you for so long. He is a prominent scientist. As an employee of the former United States Bureau of Fisheries he served in Washington and Alaska. Since then he has served the State of Washington and, more recently, he left the State of Oregon where he was Director of the State Department of Fisheries, to accept a position which we encouraged him to accept here. We feel we have a valuable asset in Arnie Suomela. He is going to share some of this burden that I have carried, and be able to act, in many cases, with much more assurance and certainty than at times I have felt; and I shall rely heavily upon him.

I have said that regulation of fisheries must take into account not only fish but men. This was brought vividly home to me recently in a problem which we have had to deal with in Alaska in considering the annual regulations.

We saw earlier this afternoon a chart of the world distribution of herring. This fish is widespread throughout the northern hemisphere, and sometimes and in some places is an enormously productive resource. However, that seems to be not its condition at present in Alaska.

When we started on the regulations I paid no particular attention to the herring fishery, for it had seemed relatively unimportant. But I did look at the records; and found there had been a herring fishery in Cook Inlet which had disappeared, a herring fishery around the Kodiak area which had practically disappeared, a herring fishery in the Prince William Sound area which had practically disappeared, and a herring fishery in Southeastern Alaska whose yield had dropped from over 400,000 barrels to less than 100,000 barrels and had remained at that low level during five seasons.

I found some rather disturbing information that spawning areas had become reduced. What would you do with that information? Stand by and do nothing and perhaps let another herring fishery disappear from Alaska? Or should you do the thing that looks reasonable and practical—the only thing that you could do? Preserve the remnants that were there in the hope that the added spawning effort might contribute to a more rapid recovery?

But in keeping with what I consider an obligation of the Fish and Wildlife Service—that, where possible, regulations should be based neither on a capricious snap judgment nor even on well-organized thinking, but rather on biological facts—I requested more information. I was really amazed at the added amount of it which our biologists brought forth. So I found some of these things you have been hearing about this afternoon, which must be taken into account in for-

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mulating regulations. It appears that factors besides the amount of spawning influence the abundance and accessibility of herring. Furthermore, our biologists point out that it is desirable to retain a sampling of the stocks, so as to maintain a means of assessing their commercial possibilities.

Then involved in all this is an issue which has become a highly emotional matter in Southeastern Alaska. In preparation for the Seattle hearings, I made a quick trip to Juneau, Ketchikan, Wrangell, and Petersburg to meet with the fishermen. From their point of view everything that was wrong with the salmon trawling was due to the herring fishery. That became the focal point of our discussion; and all that those fishermen said we studied very seriously along with all of the facts which we could dig out of our records about herring. Thus we have considered this herring case from every point of view, and when our decision is announced, you may be sure that it is as right as our most careful judgment has been able to make it.

Although people do not always unanimously approve of the choice of regulations, they generally do agree to the necessity of some action to conserve the resources. Here I must pay tribute to the way in which members of the industry and the fishermen have cooperated in a 50 percent reduction of traps in Southeastern Alaska for next year. This means 50 percent reduction of the effective areas for fishing; and this program will continue for two years because it looks as if there will be two bad years. Giving up so much following such a bad season as the last means a lot to fishermen and operators; and that is why we so thoroughly appreciate their cooperation.

In the background of all regulations for conservation is the work of researchers. Ours is primarily a research agency. The Service was founded on research, and it will continue to foster research. Over the course of a number of years, I have had ample opportunity to observe researchers at work in two governmental agencies, state and federal; and also have seen something of them in private industry. They are interesting people. They have carried into their mature years the youthful urge to ask questions and get answers. The practical need of the answers is sometimes secondary with them. Their primary interest is to extend or fill in the gaps in their present field of information. They find an unusual joy in discovery. When after long hard work they find at last something they have been looking for, whatever it may be—the answer to a problem, the formula to a chemical, the spawning grounds of a fish—they have a way of announcing their discovery modestly in the sometimes incomprehensible language of science, then putting it aside and starting a search for something else. They never slake their thirst for search. At least, they don't if they are any good. One exasperating thing about scientists is that they often don't stop their search soon enough. Just when they seem to have uncovered great new avenues of knowledge, they look a little further, and discover more ignorance which needs further investigation than we had been aware of. No matter how long they work, they always see more questions to study.

We hear much discussion about the difference between pure research and practical research. I am not particularly excited about that. I don't know where one begins and the other ends. When we get to the point where we start applying the research that had started out as "pure" it automatically becomes "practical"; and if it can't ever become practical, then we as businessmen are not quite so interested in it. The first step of any scientific undertaking is not to determine its purity, but to put up to the scientist the right question in the right way. This often determines the whole course of the research. In actual practice, the scientist formulates these questions. He puts a selection of them up to the administrator, and the administrator selects those which are most germane to his public problems. Sometimes, in attacking the selected questions, the scientist finds it necessary to make incursions into the realm of pure science in order to reach principles that can be used in applied science. Here I think the task of the administrator is to find the importance of the pure to the applied, and then to give it all the scope necessary to achieve the goals which we set in our questions.

The most important function of the administrator of an agency like ours is to find men of brains and education who are willing to dedicate themselves to research about fishery problems. We devote a great deal of time to scouting for such people; we spot them in universities sometimes long before they acquire their degrees. We regard the time given to this as a very good investment in the future. Once we get such people, our job is to provide a fertile atmosphere for their doing a superlatively good job.

The administrator discovers very soon that good fishery research is expensive; and there seems to be no limit to the amount of money that scientists could profitably use. At a time when economy is a keynote of government, this poses a very perplexing problem; for it is not possible to carry on research without men and equipment. Some necessary observations can be made only at sea, and must continue year after year; therefore, we can't do without vessels—and I need not tell you how much it costs to operate vessels. The scientist working ashore needs things like analytical balances, spectroscopes, electron microscopes, experimental aquaria, and all manner of special, costly devices. I am continually told about problems that can't be solved without these things. Here the administrator has the thankless job of distinguishing between what is likely to be absolutely essential to the solution of a problem and what is merely a good thing to have to fit out a well-rounded, well-equipped research laboratory.

There is occasionally some controversy as to who is to do the work of research. It sometimes appears to us that all fishery institutions and all fishery scientists would like to have the honor and pleasure of directing and conducting all the research in their respective fields. To some extent this is as it should be. A spirit of competition has a place among research workers as a stimulant; but the place is a very small one. For the truth is, there are far too many fishery problems waiting to be solved, and the problems are far too large for the means that are available, and the number of competent research men is far too small to allow such a question to take on very great importance. To make the best use of such funds, facilities, men and agencies as there are, we must give every possible encouragement to collaboration, bringing all interested groups together in the planning and execution of fishery research programs involving large areas and several jurisdictions. Moreover, every precaution must be taken to assure proper coordination of the work of different institutions so as to obviate overlapping.

In conclusion, I would like to reiterate that I recognize the serious impact which regulations have on industry. I recognize that all too frequently regulations have to be made on incomplete information. At the same time I would like to assure you, that so far as it is humanly possible, it it the aim of the Fish and Wildlife Service to make its administrative regulations responsive to the scientific knowledge that is available, and as reasonable and helpful for a continuing productive fishery as it is possible to devise. That is our aim and that is our service to you.

Officers Elected by Other Associations

Officers of other trade associations, elected at their annual meetings during the Convention period, are:

Canning Machinery and Supplies Association

President—E. N. Funkhouser, Dewey & Almy Chemical Co., Cambridge, Mass.; vice president—C. K. Wilson, Food Machinery & Chemical Corp., San Jose, Calif.; secretary-treasurer—W. D. Lewis, Washington, D. C. (reelected); ex officio—Hal W. Johnston, Stecher-Traung Lithograph Corp., Rochester, N. Y.

The Forty Niners

President—M. R. Feeney, Lansing B. Warner, Inc., Chicago; vice president—David S. Nay, Wm. J. Stange Co., Chicago; secretary-treasurer—Frank Langsenkamp, Jr., F. H. Langsenkamp Company, Indianapolis.

National Food Brokers Association

National chairman—Willis Johnson, Jr., Willis Johnson & Company, Little Rock, Ark.; first vice chairman—Truman Graves, Graves-Chambers Co., Seattle; second vice chairman—Walter Burns, Walter H. Burns Co., Pittsburgh; third vice chairman—A. Earle Clark, Jr., A. Earle Clark & Son, Miami; treasurer—Harry E. Cook, Harry B. Cook Company, Baltimore (reelected); member-at-large—Jean Bistline, Bistline Brokerage Co., Denver; president—Watson Rogers, Washington, D. C. (reelected).

National-American Wholesale Grocers Association

President—Ned Fleming, Fleming Co., Topeka, Kans.; vice presidents—Walter Fleck, Floom-Fleck Co., Tiffin, Ohio; J. D. Gamel, Waples Platter Co., Fort Worth, Tex.; Isadore Greenspan, Flagstaff Foods, Perth Amboy, N. J.; and J. E. Parker, Milliken-Tomlinson Co., Portland, Me.; chairman of the board—French Fox, Fox Grocery Co., Charleroi, Pa.; treasurer—J. Stanley Seeman, Seeman Bros., New York (reelected); executive vice president—Ralph B. Johnson, New York.

M. L. Toulme is retiring as executive vice president March 1 after 34 years with N.A.W.G.A.

National Preservers Association

President—Buell H. Bedford, Bedford Products, Inc., Dunkirk, N. Y.; vice presidents—W. Kyrel Meschter, American Preserve Company, Philadelphia; Paul Smucker, The J. M. Smucker Company, Orrville, Ohio; and A. H. Blount, Tea Garden Products Co., San Leandro, Calif.; secretary-treasurer—John C. Fosgate, Chester C. Fosgate Co., Orlando, Fla.; and managing director—W. Lowe Walde, Washington, D. C. (all reelected).

Old Guard Society

President—William N. Campbell, The Fayette Canning Co., Washington C. H., Ohio; first vice president—Ogden Sells, San Jose, Calif. (reelected); second vice president—T. J. Marguerite, Franklin-MacVeagh Co., Chicago; secretary-treasurer—John Dingee, The Crown Cork & Seal Co., Crown Can Division, Philadelphia (reelected).

Young Guard Society

President—Reid W. Jensen, Varney Canning Co., Roy, Utah; first vice president—Robert L. Eirich, H. S. Crocker Co., Inc., Baltimore; second vice president—Ed Raley, Raley Brothers, Inc., Atlanta; secretary—Herb Shek, H. S. Crocker Co., Inc., Baltimore (reelected); treasurer—Robert W. Mairs, Winter Garden Citrus Products Coop., Winter Garden, Fla. (reelected); recording secretary—Arthur Judge, Jr., The Canning Trade, Baltimore (reelected).

Association of Canners State and Regional Secretaries

President—Edwin W. Elmer, Minnesota Canners Association, Minneapolis, Minn.; vice president—C. Walt York, Pennsylvania Canners Association, York, Pa.; secretary-treasurer—John W. Rue, Tri-State Packers Association, Easton, Md.

The Tomato Council, Inc.

President—William R. Edmunds, D. E. Foote & Co., Baltimore; treasurer—Wilson M. Jarboe, Harrison & Jarboe, Sherwood, Md.; manager—Charles B. Silver II, Charles B. Silver & Son, Havre de Grace, Md.; secretary—Mrs. Helen W. Rue, Easton, Md. (reelected).

Elton S. Shaw

Elton S. (Bing) Shaw of the Wood Canning Company, Stockton, Calif., died at the Atlantic City Convention on Sunday, January 24, following a heart attack he suffered on Friday morning, January 22.

Well known to the canning industry and particularly to the Pacific Coast area, Mr. Shaw was an alternate director of the Canners League of California for his firm. The Canners League issued a special announcement during the Convention on receipt of the news and handled the details of flying the body back to Stockton for funeral services held there on January 27.

Mr. Shaw was a former member of the N. C. A. Board of Directors, 1947-50, and served on the Claims Committee in 1950.

Dana M. Hubbard

Dana M. Hubbard, 60, well known to the canning industry as editor of *The Canner* magazine for the past 21 years, died Tuesday, January 26, in an Evanston, Ill., hospital. News of his passing was given out during the Convention, the first of these annual gatherings Mr. Hubbard had missed since he entered the industry. He had been ill for several months.

Mr. Hubbard was born October 20, 1893, in Somerville, Mass., and was a graduate of Brown University, where he was a member of Delta Upsilon fraternity, a varsity trackman and editor of the campus newspaper. During World War I, he was a captain in the Yankee Division, AEF, and served as Paris correspondent for the *Providence Journal*. He received the Purple Heart and a Silver Star.

After the war he joined the editorial staff of *Printers' Ink* and worked in both the New York and Chicago offices. Later he did advertising and promotional work for Elmer Doe Advertising Agency, Louisville, Ky. In October, 1932, he became editor of *The Canner*.

Articles and stories by Mr. Hubbard have appeared in many national magazines, including the American Legion magazine, *Saturday Evening Post*, *Nation's Business* and *Readers' Digest*.

Mr. Hubbard was a member of Sigma Delta Chi, professional journalism fraternity, the Old Guard Society of the canning industry, associate member of the Chicago chapter of the Institute of Food Technologists, and a member of Brown University's Chicago alumni association. He was past president of Delta Upsilon fraternity Chicago alumni association, former adjutant of the Chicago Advertising Men's post, American Legion, and former commander of the Yankee Division Post.

Convention Proceedings

(Concluded from page 13)

Three technical conferences were sponsored by the N.C.A. Laboratories and three raw products conferences by the N.C.A. Raw Products Research Bureau, all well attended. These covered current factory and field problems.

One of the Laboratory conferences was jointly sponsored by N.C.A. and the Canning Machinery and Supplies Association and dealt with filling procedures in the cannery. John Dingee of the Crown Can Division of Crown Cork & Seal Company, Inc., presided, and panel members were drawn from both the canning and machinery industries. Cannery boiler operations were handled at another session, and at this meeting Drs. E. J. Cameron and J. Russell Esty collaborated in a paper on "How the N.C.A. Research Laboratories Serve the Canning Industry."

The Laboratories and the Raw Products Research Bureau also participated in a joint session at which members of N.C.A. Counsel spoke on pesticide legislation and food standards. All papers and presentationns at these technological sessions are reproduced in full in this issue.

The Raw Products Conferences dealt with quality factors involved in red cherry and pea packing; tomato grade relationships; peach harvesting; research on drosophila control; and spray problems.

Problems of fluctuating fishery stocks and a report on "Service Research and the Fishing Industry" were treated by three fishery authorities in the Fisherv Products Conference held Sunday and presided over by Arthur H. Mendonca, Chairman of the N.C.A. Fishery Products Committee. All of these manuscripts are fully reproduced in the section of this issue, beginning on page 99.

While these N.C.A. programs were in progress, the Canning Machinery and Supplies Association, utilizing more than 100,000 square feet of the vast Atlantic City Auditorium, sponsored the presentation daily of 150 exhibits of the newest items of machinery, equipment, supplies and products used by canners. C.M. & S.A. reported registration of 8,118 visitors at the exhibit. Not counted in this total are members of the National Food Brokers Association and the National-American Wholesale Grocers Association, whose badges were honored without registration at the exhibit. N.F.B.A. registration, including an estimate for non-canner principals, was computed at 6,000 and the figure for N.A.W.G.A. was estimated at about 2,000. A majority of these two groups attended the exhibit. The Atlantic City Convention Bureau estimated that total attendance of all factors at the Convention, during the period January 23-27, came to about 18,000.

The Forty Niners group of C.M. & S.A. honored Dean Samuel C. Prescott, professor emeritus of Massachusetts Institute of Technology and a pioneer in canning technology, at special ceremonies on January 22. With Robert A. Sindall, Jr., presiding as president of the 49ers, Dr. Prescott was awarded the first of a series of annual service awards, a plaque and a scroll. James McGowan, Jr., chairman of the board of the Campbell Soup Company, paid a tribute to the character, the career and the contribution of Dean Prescott; Dr. Roger Lueck of American Can Company reviewed the development of the art of heat sterilization and the science of bacteriology and assessed the great importance of the Prescott-Underwood studies of more than half a century ago; and Dr. Prescott related some of his personal experience with the canners of the early days when his findings were first being revealed. Copies of the addresses at the service award ceremony are being compiled into a special brochure by The Forty Niners, which will be available shortly on request addressed to the Canning Machinery and Supplies Association, P. O. Box 5926, Washington 14, D. C.

Convention Publications

Certain publications are prepared annually by the N. C. A. for distribution and use at the Annual Convention.

Among these this year was the official *Convention Room Directory* (120 pages), distributed on Friday, January 22. This included all the listings of members of the N. C. A.; state, regional and commodity association headquarters; members of the N. F. B. A. and their noncanner principals; members of the C. M. & S. A. along with their exhibit booth locations; and miscellaneous delegates housed by the three sponsor associations. The directory also included locations and phone numbers of the principal Atlantic City hotels, a map of the city, floor plans of the exhibit locations, and phone numbers and locations of the various information and registration centers. The directory was published by courtesy of the Atlantic City Convention Bureau. The editorial and production supervision of copy prepared by the three sponsor associations was carried out by the N. C. A. Information Division.

The Information Division also produced the official N. C. A. *Convention Program* (24 pages) giving agenda details of the several program sessions held by the Association, as well as daily hour-by-hour records of the principal events of the over-all Convention.

N.C.A. Publicity Activities at the Convention

A Press Room was maintained by the staff of the Information Division of the N. C. A. on the Sundeck, Hotel Traymore, throughout the Convention for the use of some 100 newspaper, magazine, radio and TV representatives covering the event.

Copies of the 31 Convention speeches, summaries, and statements were available there, along with eight special news releases written and issued during the proceedings. Photos and biographies of speakers and officers were issued also, and the Information staff assisted reporters with background information and in other ways. Much of this appeared in daily newspaper accounts and features in Atlantic City, Philadelphia, and elsewhere, as well as on radio and TV newscasts. Special mailings were made also to more than 110 publications throughout the country that did not have representatives in Atlantic City.

Ratzesberger Addresses Rotary

President Louis Ratzesberger, Jr., was guest speaker at a meeting of the Atlantic City Rotary Club on January 26, speaking on the subject, "The Canner's Contribution to the Public Welfare." Mr. Ratzesberger is a past president of the Hoopeston, Ill., Rotary Club. He related facts about the Convention and about the public service values of the canning industry, in terms of its contribution to public health, welfare and feeding convenience, benefits to farmer and labor, size of its operation, and its economy to the consumer.

Campbell at Exchange Club

Executive Secretary Carlos Campbell was guest speaker at the weekly meeting of the Exchange Club of Atlantic City on Wednesday, January 27. Mr. Campbell's title was "Convention Management—Canner Style." He explained the methods of planning, staging, and managing this annual event, pointing out specific differences such as Association allotment of room numbers to members that distinguish a Canners Convention from the usual type of trade assembly.

McCall's Magazine Feature

McCall's magazine saluted canned foods week at the Convention by distributing to the room of each delegate an advance copy of their February issue containing an eight-page color canned food editorial feature, written by their food editor, Helen McCully. It included six full color pages of meal ideas that used canned foods as the main ingredient. The recipe ideas featured canned meat, vegetables, soups, fish, and fruits.

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